SALVATION ARMY DIVISION CAMP AND RETREAT CENTER

APPENDIX G

Stormwater Management Plan for the Salvation Army Camp Retreat Center

Prepared by Fuscoe Engineering

November/December 2009

STORM WATER MANAGEMENT PLAN

SALVATION ARMY DIVISIONAL CAMP AND RETREAT
RAMONA, CA
NOVEMBER 2009

Prepared For: Salvation Army

Prepared By: Fuscoe Engineering, Inc.

Job Number: 02457-001-01

FUSCOE ENGINEERING

full circle thinking

MEMORANDUM

To: Tim Gnibus
Date: December 2, 2009
Subject: Salvation SWMP Revision Summary

The 2003 Storm Water Management Plan (SWMP) for the Salvation Army Expansion project was revised and resubmitted in November of 2009. The revisions were provided to address the following: issues raised by public comments, revisions to the site plan, and changes to storm water quality standards and requirements set forth by the San Diego Regional Water Quality Control Board (SDRWQCB) and the County of San Diego. The prior SWMP, prepared in 2003, was prepared in accordance with the 2001 Municipal Permit (issued by the SDRWQCB) and 2003 County SUSMP. The SDRWQCB adopted a new Municipal Permit in 2007 that provided additional and/or revised requirements regarding storm water quality protection and pollution prevention. Accordingly, the County revised their SUSMP in 2008 to comply with the 2007 Municipal Permit requirements. As a result, the overall template and setup of the project 2009 SWMP has been dramatically revised when compared to the 2003 SWMP. Therefore it is simply not feasible or practical to provide a strikethrough/underline version of the revised SWMP. For the benefit of the reviewer, the revisions to the SWMP are more fully described below:

1. The SWMP is now preceded by the County of San Diego form for priority projects (Major SWMP). This form was not required in 2003.
2. Section 1.1 now includes the table for SUSMP Priority Project Categories, consistent with the County of San Diego SUSMP requirements.
3. 303(d) listing now references the 2006 statewide 303(d) list of impaired waterbodies.
4. The SWMP has added section 2.2 which discusses the regulatory framework related to storm water quality that the project and SWMP have been designed to comply with.
5. Section 3.0 of the SWMP discusses hydrologic conditions and hydromodification impacts consistent with current County SUSMP requirements which were revised in accordance with the 2007 Municipal Permit issued by the SDRWQCB.
6. The Construction Phase pollutants section has been revised to provide a more complete listing of potential construction phase pollutants that may be present. This revision was provided in response to public comment JH11.
7. The construction phase BMP section has been revised to include additional description of construction phase BMPs that may be employed in response to comment JH11.
8. The post construction BMP section has been revised in accordance with current County SUSMP and Municipal Permit requirements to include Low Impact Development Design Concepts.

9. Source Control BMPs have been clarified to include site-specific requirements such as the swimming pool and secondary containment for chemical and material storage areas.
10. Catch basin filter inserts are no longer included with the project and have been removed from the SWMP discussion.
11. The treatment Control BMP section has been revised in accordance with current County SUSMP requirements to include tables referring to Pollutant Removal Characteristics (Table 5) and Pollutant Removal Efficiencies (Table 6).
12. The SWMP has been revised to indicate that a detention basin is now included in Area 1 of the project, and additional detention basins have been added to Area 6.
13. The Operation and Maintenance section of the SWMP has been revised in accordance with comments received from the County and includes a listing of conditions of approval for the project that are related to BMP maintenance.
14. Post Construction BMP maintenance requirements have been expanded to include additional requirements for site design and LID BMPs.
15. The SWMP Appendices have been revised in accordance with current County SUSMP requirements which provide guidance on the appendices that are required to be included with the SWMP.

Storm Water Management Plan
For Priority Projects
(Major SWMP)

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

Project Name:	SALVATION ARMY DIVISIONAL CAMP AND RETREAT CENTER
Permit Number (Land Development Projects):	MUP P70-379
Work Authorization Number (**CIP only**):	
Applicant:	THE SALVATION ARMY
Applicant's Address:	2320 FIFTH AVENUE, SAN DIEGO, CA 92101
Plan Prepare By (*Leave blank if same as applicant*):	FUSCOE ENGINEERING
Date:	OCTOBER 30, 2009
Revision Date (If applicable):	

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9926) requires all applications for a permit or approval associated with a Land Disturbance Activity to be accompanied by a Storm Water Management Plan (SWMP) (section 67.806.b). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority development project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Stages	Does the SWMP need revisions?		If YES, Provide Revision Date
	YES	NO	

Instructions for a Major SWMP can be downloaded at
http://www.sdcounty.ca.gov/dpw/watersheds/susmp/susmp.html

Completion of the following checklists and attachments will fulfill the requirements of a Major SWMP for the project listed above.

PROJECT DESCRIPTION

Please provide a brief description of the project in the following box. Please include:

- Project Location
- Project Description
- Physical Features (Topography)
- Surrounding Land Use
- Proposed Project Land Use
- Location of dry weather flows (year-round flows in streams, or creeks) within project limits, if applicable.

SEE ATTACHED STORM WATER MANAGEMENT PLAN

PRIORITY DEVELOPMENT PROJECT DETERMINATION

Please check the box that best describes the project. Does the project meet one of the following criteria?

Table 1

PRIORITY DEVELOPMENT PROJECT	YES	NO
Redevelopment that creates, adds or replaces at least 5,000 square feet of impervious surface area and falls under one of the criteria listed below.	X	
Residential development of more than 10 units.		X
Commercial developments with a land area for development of greater than 1 acre.	X	
Heavy industrial development with a land area for development of greater than 1 acre.		X
Automotive repair shop(s).		X
Restaurants, where the land area for development is greater than 5,000 square feet.	X	
Hillside development, in an area with known erosive soil conditions, where there will be grading on any natural slope that is twenty-five percent or greater, if the development creates 5,000 square feet or more of impervious surface.	X	
Environmentally Sensitive Areas (ESA): All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.		X
Parking Lots 5,000 square feet or more or with 15 parking spaces or more and potentially exposed to urban runoff.	X	
Streets, roads, highways, and freeways which would create a new paved surface that is 5,000 square feet or greater.	X	
Retail Gasoline Outlets (RGO) that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.		X

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects. Parking lots, buildings and other structures associated with utility projects are subject to the WPO requirements if one or more of the criteria above are met.

If you answered **NO** to all the questions, then **STOP**. Please complete a Minor SWMP for your project.
If you answered **YES** to any of the questions, please continue.

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to hydromodification management issues.

Table 2

	QUESTIONS	YES	NO	Information
1.	Will the proposed project disturb 50 or more acres of land? (Including all phases of development)		X	If YES, continue to 2. If NO, go to 6.
2.	Would the project site discharge directly into channels that are concrete-lined or significantly hardened such as with rip-rap, sackcrete, etc, downstream to their outfall into bays or the ocean?			If NO, continue to 3. If YES, go to 6.
3.	Would the project site discharge directly into underground storm drains discharging directly to bays or the ocean?			If NO, continue to 4. If YES, go to 6.
4.	Would the project site discharge directly to a channel (lined or un-lined) and the combined impervious surfaces downstream from the project site to discharge at the ocean or bay are 70% or greater?			If NO, continue to 5. If YES, go to 6.
5.	Project is required to manage hydromodification impacts.			Hydromodification Management Required as described in Section 67.812 b(4) of the WPO.
6.	Project is not required to manage hydromodification impacts.			Hydromodification Exempt. Keep on file.

An exemption is potentially available for projects that are required (No. 5. in Table 2 above) to manage hydromodification impacts: The project proponent may conduct an independent geomorphic study to determine the project's full hydromodification impact. The study must incorporate sediment transport modeling across the range of geomorphically-significant flows and demonstrate to the County's satisfaction that the project flows and sediment reductions will not detrimentally affect the receiving water to qualify for the exemption.

STORMWATER QUALITY DETERMINATION

The following questions provide a guide to collecting information relevant to project stormwater quality issues. Please provide the following information in a printed report accompanying this form.

Table 3

	QUESTIONS	COMPLETED	NA
1.	Describe the topography of the project area.	X	
2.	Describe the local land use within the project area and adjacent areas.	X	
3.	Evaluate the presence of dry weather flow.	X	
4.	Determine the receiving waters that may be affected by the project throughout all phases of development through completion (i.e., construction, long-term maintenance and operation).	X	
5.	For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern.	X	
6.	Determine if there are any High Risk Areas (which is defined by the presence of municipal or domestic water supply reservoirs or groundwater percolation facilities) within the project limits.	X	
7.	Determine the Regional Board special requirements, including TMDLs, effluent limits, etc.	X	
8.	Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves.	X	
9.	Determine the soil classification, permeability, erodibility, and depth to groundwater for Treatment BMP consideration.	X	
10.	Determine contaminated or hazardous soils within the project area.	X	
11.	Determine if this project is within the environmentally sensitive areas as defined on the maps in Appendix A of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects.*	X	
12.	Determine if this is an emergency project.	X	

WATERSHED

Please check the watershed(s) for the project.

☐ San Juan 901	☐ Santa Margarita 902	☐ San Luis Rey 903	☐ Carlsbad 904
☐ San Dieguito 905	☐ Penasquitos 906	☒ San Diego 907	☐ Sweetwater 909
☐ Otay 910	☐ Tijuana 911	☐ Whitewater 719	☐ Clark 720
☐ West Salton 721	☐ Anza Borrego 722	☐ Imperial 723	

Please provide the hydrologic sub-area and number(s)

Number	Name
907.20	SAN VICENTE HYDROLOGIC AREA
907.21	FERNBROOK HYDROLOGIC SUB-AREA

Please provide the beneficial uses for Inland Surface Waters and Ground Waters. Beneficial Uses can be obtained from the Water Quality Control Plan for the San Diego Basin, which is available at the Regional Board office or at http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

SURFACE WATERS	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Inland Surface Waters																
WEST BRANCH SAN VICENTE CREEK	907.21	X	X	X	X				X	X		X	X	X		
Ground Waters																
SAN VICENTE	907.20	X	X													

*** Excepted from Municipal**

X Existing Beneficial Use
0 Potential Beneficial Use

POLLUTANTS OF CONCERN

Using Table 4, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

Table 4. Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
PDP Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development 1 acre or greater	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft^2	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Note: If other monitoring data that is relevant to the project is available. Please include as Attachment C.

CONSTRUCTION BMPs

Please check the construction BMPs that may be implemented during construction of the project. The applicant will be responsible for the placement and maintenance of the BMPs incorporated into the final project design.

- ☑ Silt Fence
- ☑ Fiber Rolls
- ☑ Street Sweeping and Vacuuming
- ☑ Storm Drain Inlet Protection
- ☑ Stockpile Management
- ☑ Solid Waste Management
- ☑ Stabilized Construction Entrance/Exit
- ☑ Dewatering Operations
- ☑ Vehicle and Equipment Maintenance
- ☑ Desilting Basin
- ☑ Gravel Bag Berm
- ☐ Sandbag Barrier
- ☑ Material Delivery and Storage
- ☑ Spill Prevention and Control
- ☑ Concrete Waste Management
- ☑ Water Conservation Practices
- ☑ Paving and Grinding Operations

- ☑ Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices.

Table 5

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqtmdls.pdf		X	If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?			If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal: vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?			If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4?			If YES, continue to 6. If NO, go to 5.
5.	Project is not required to use Advanced Treatment BMPs.			Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.			Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria

Exemption potentially available for projects that require advanced treatment: Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that shows to the County official's satisfaction that advanced treatment is not required

Now that the need for treatment BMPs has been determined, other information is needed to complete the SWMP.

SITE DESIGN

To minimize stormwater impacts, site design measures must be addressed. The following checklist provides options for avoiding or reducing potential impacts during project planning. If YES is checked, it is assumed that the measure was used for this project.

Table 6

	OPTIONS		YES	NO	N/A
1.	Has the project been located and road improvements aligned to avoid or minimize impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions?		X		
2.	Is the project designed to minimize impervious footprint?		X		
3.	Is the project conserving natural areas where feasible?		X		
4.	Where landscape is proposed, are rooftops, impervious sidewalks, walkways, trails and patios be drained into adjacent landscaping?		X		
5.	For roadway projects, are structures and bridges be designed or located to reduce work in live streams and minimize construction impacts?				X
6.	Can any of the following methods be utilized to minimize erosion from slopes:				
	6.a.	Disturbing existing slopes only when necessary?	X		
	6.b.	Minimize cut and fill areas to reduce slope lengths?	X		
	6.c.	Incorporating retaining walls to reduce steepness of slopes or to shorten slopes?	X		
	6.d.	Providing benches or terraces on high cut and fill slopes to reduce concentration of flows?	X		
	6.e.	Rounding and shaping slopes to reduce concentrated flow?	X		
	6.f.	Collecting concentrated flows in stabilized drains and channels?	X		

LOW IMPACT DEVELOPMENT (LID)

Each numbered item below is a LID requirement of the WPO. Please check the box(s) under each number that best describes the Low Impact Development BMP(s) selected for this project.

Table 7

1. Conserve natural Areas, Soils, and Vegetation-County LID Handbook 2.2.1
☒ Preserve well draining soils (Type A or B)
☒ Preserve Significant Trees
☒ Other. Description: ALL NATURAL VEGETATION AND HABITATS WILL BE PRESERVED IN AREAS THAT ARE TO REMAIN UNDISTURBED.
☐ 1. Not feasible. State Reason:
2. Minimize Disturbance to Natural Drainages-County LID Handbook 2.2.2
☒ Set-back development envelope from drainages
☒ Restrict heavy construction equipment access to planned green/open space areas
☐ Other. Description:
☐ 2. Not feasible. State Reason:
3. Minimize and Disconnect Impervious Surfaces (see 5) -County LID Handbook 2.2.3
☒ Clustered Lot Design
☒ Items checked in 5?
☐ Other. Description:
☐ 3. Not feasible. State Reason:
4. Minimize Soil Compaction-County LID Handbook 2.2.4
☒ Restrict heavy construction equipment access to planned green/open space areas
☒ Re-till soils compacted by construction vehicles/equipment
☒ Collect & re-use upper soil layers of development site containing organic materials (TO BE DETERMINED AT FINAL ENGINEERING)
☐ Other. Description:
4. Not feasible. State Reason:
5. Drain Runoff from Impervious Surfaces to Pervious Areas-County LID Handbook 2.2.5

LID Street & Road Design	
☐	Curb-cuts to landscaping
☒	Rural Swales
☐	Concave Median
☒	Cul-de-sac Landscaping Design (IN AREA 5/6A)
☐	Other. Description:
LID Parking Lot Design	
☒	Permeable Pavements USE OF NATIVE GRANULAR MATERIAL
☐	Curb-cuts to landscaping
☒	Other. Description: RAIN GARDEN IN INTERIOR LANDSCAPED PORTION OF PARKING LOT
LID Driveway, Sidewalk, Bike-path Design	
☒	Permeable Pavements
☒	Pitch pavements toward landscaping
☒	Other. Description: USE OF RURAL SWALES
LID Building Design	
☒	Cisterns & Rain Barrels
☒	Downspout to swale
☐	Vegetated Roofs
☐	Other. Description:
LID Landscaping Design	
☐	Soil Amendments
☒	Reuse of Native Soils
☐	Smart Irrigation Systems
☐	Street Trees
☒	Other. Description: USE OF NATIVE SPECIES/DROUGHT TOLERANT SPECIES
☐ 5. Not feasible. State Reason:	

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

Table 8

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?	X			If YES go to 2 If NO go to 13.
2.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 6.
3.	Will the project discharge to unlined channels?	X			If YES go to. 6.
4.	Will the project increase potential sediment load of downstream flow?				If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?				If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.			X	Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.			X	Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.	X			Continue to 11.
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.		X		Continue to 12.
12.	Provide other design principles that are comparable and equally effective.			X	Continue to 13.
13.	End				

SOURCE CONTROL

Please complete the following checklist for Source Control BMPs. If the BMP is not applicable for this project, then check N/A only at the main category.

Table 9

	BMP		YES	NO	N/A
1.	**Provide Storm Drain System Stenciling and Signage**		X		
	1.a.	All storm drain inlets and catch basins within the project area shall have a stencil or tile placed with prohibitive language (such as: "NO DUMPING – DRAINS TO _____") and/or graphical icons to discourage illegal dumping.	X		
	1.b.	Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the project area.	X		
2.	**Design Outdoors Material Storage Areas to Reduce Pollution Introduction**		X		
	2.a.	This is a detached single-family residential project. Therefore, personal storage areas are exempt from this requirement.		X	
	2.b.	Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.	X		
	2.c.	The storage area shall be paved and sufficiently impervious to contain leaks and spills.	X		
	2.d.	The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.	X		
3.	**Design Trash Storage Areas to Reduce Pollution Introduction**		X		
	3.a.	Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; or,	X		
	3.b.	Provide attached lids on all trash containers that exclude rain, or roof or awning to minimize direct precipitation.	X		
4.	**Use Efficient Irrigation Systems & Landscape Design**		X		
	The following methods to reduce excessive irrigation runoff shall be considered, and incorporated and implemented where determined applicable and feasible.				
	4.a.	Employing rain shutoff devices to prevent irrigation after precipitation.		X	
	4.b.	Designing irrigation systems to each landscape area's specific water requirements.	X		
	4.c.	Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.		X	
	4.d.	Employing other comparable, equally effective, methods to reduce irrigation water runoff. USE OF DROUGHT-TOLERANT NATIVE SPECIES	X		
5.	**Private Roads**				

	BMP		YES	NO	N/A
	The design of private roadway drainage shall use at least one of the following				
	5.a.	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	X		
	5.b.	Urban curb/swale system: street slopes to curb, periodic swale inlets drain to vegetated swale/biofilter.		X	
	5.c.	Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to storm water conveyance system.		X	
	5.d.	Other methods that are comparable and equally effective within the project.			X
6.	**Residential Driveways & Guest Parking**		X		
	The design of driveways and private residential parking areas shall use one at least of the following features.				
	6.a.	Design driveways with shared access, flared (single lane at street) or wheelstrips (paving only under tires); or, drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.b.	Uncovered temporary or guest parking on private residential lots may be: paved with a permeable surface; or, designed to drain into landscaping prior to discharging to the storm water conveyance system.	X		
	6.c.	Other features which are comparable and equally effective.			
7.	**Dock Areas**				X
	Loading/unloading dock areas shall include the following.				
	7.a.	Cover loading dock areas, or design drainage to preclude urban run-on and runoff.			
	7.b.	Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.			
	7.c.	Other features which are comparable and equally effective.			
8.	**Maintenance Bays**				X
	Maintenance bays shall include the following.				
	8.a.	Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff.			
	8.b.	Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.			
	8.c.	Other features which are comparable and equally effective.			
9.	**Vehicle Wash Areas**				X
	Priority projects that include areas for washing/steam cleaning of vehicles shall use the following.				
	9.a.	Self-contained; or covered with a roof or overhang.			
	9.b.	Equipped with a clarifier or other pretreatment facility.			
	9.c.	Properly connected to a sanitary sewer.			
	9.d.	Other features which are comparable and equally effective.			

	BMP		YES	NO	N/A
10.	**Outdoor Processing Areas**				X
	Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, waste piles, and wastewater and solid waste treatment and disposal, and other operations determined to be a potential threat to water quality by the County shall adhere to the following requirements.				
	10.a.	Cover or enclose areas that would be the most significant source of pollutants; or, slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment in accordance with conditions established by the applicable sewer agency.			
	10.b.	Grade or berm area to prevent run-on from surrounding areas.			
	10.c.	Installation of storm drains in areas of equipment repair is prohibited.			
	10.d.	Other features which are comparable or equally effective.			
11.	**Equipment Wash Areas**				X
	Outdoor equipment/accessory washing and steam cleaning activities shall be.				
	11.a.	Be self-contained; or covered with a roof or overhang.			
	11.b.	Be equipped with a clarifier, grease trap or other pretreatment facility, as appropriate			
	11.c.	Be properly connected to a sanitary sewer.			
	11.d.	Other features which are comparable or equally effective.			
12.	**Parking Areas**		X		
	The following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the County.				
	12.a.	Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	X		
	12.b.	Overflow parking (parking stalls provided in excess of the County's minimum parking requirements) may be constructed with permeable paving.	X		
	12.c.	Other design concepts that are comparable and equally effective.	X		
13.	**Fueling Area**		X		
	Non-retail fuel dispensing areas shall contain the following.				X
	13.a.	Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.			
	13.b.	Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.			
	13.c.	Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff.			

USE OF NATIVE GRANULAR MATERIAL

		BMP	YES	NO	N/A
	13.d.	At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.			

Please list other project specific Source Control BMPs in the following box. Write N/A if there are none.

N/A

TREATMENT CONTROL

To select a structural treatment BMP using Treatment Control BMP Selection Matrix (Table 10), each priority project shall compare the list of pollutants for which the downstream receiving waters are impaired (if any), with the pollutants anticipated to be generated by the project (as identified in Table 4). Any pollutants identified by Table 4, which are also causing a Clean Water Act section 303(d) impairment of the receiving waters of the project, shall be considered primary pollutants of concern. Priority projects that are anticipated to generate a primary pollutant of concern shall select a single or combination of stormwater BMPs from Table 10, which **maximizes pollutant removal** for the particular primary pollutant(s) of concern.

Priority development projects that are **not** anticipated to generate a pollutant for which the receiving water is CWA 303(d) impaired shall select a single or combination of stormwater BMPs from Table 10, which are effective for pollutant removal of the identified secondary pollutants of concern, consistent with the "maximum extent practicable" standard.

Table 10. Treatment Control BMP Selection Matrix

Pollutants of Concern	Bioretention Facilities (LID)*	Settling Basins (Dry Ponds)	Wet Ponds and Wetlands	Infiltration Facilities or Practices (LID)*	Media Filters	High-rate biofilters	High-rate media filters	Trash Racks & Hydro -dynamic Devices
Coarse Sediment and Trash	High	High	High	High	High	High	High	High
Pollutants that tend to associate with fine particles during treatment	High	High	High	High	High	Medium	Medium	Low
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low

*Additional information is available in the County of San Diego LID Handbook.

NOTES ON POLLUTANTS OF CONCERN:

In Table 11, Pollutants of Concern are grouped as gross pollutants, pollutants that tend to associate with fine particles, and pollutants that remain dissolved.

Table 11

Pollutant	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment	X	X	
Nutrients		X	X
Heavy Metals		X	
Organic Compounds		X	
Trash & Debris	X		
Oxygen Demanding		X	
Bacteria		X	
Oil & Grease		X	
Pesticides		X	

A Treatment BMP must address runoff from developed areas. Please provide the post-construction water quality treatment volume or flow values for the selected project Treatment BMP(s). Guidelines for design calculations are located in Chapter 5, Section 4.3, Principle 8 of the County SUSMP. Label outfalls on the BMP map. The Water Quality peak rate of discharge flow (Q_{WQ}) and the Water Quality storage volume (V_{WQ}) is dependent on the type of treatment BMP selected for the project.

Outfall	Tributary Area (acres)	Q_{WQ} (cfs)	V_{WQ} (ft^3)
SEE STORM WATER MANAGEMENT PLAN			

Please check the box(s) that best describes the Treatment BMP(s) selected for this project.

Biofilters
☒ Bioretention swale
☐ Vegetated filter strip
☐ Stormwater Planter Box (open-bottomed)
☐ Stormwater Flow-Through Planter (sealed bottom)
☐ Bioretention Area
☐ Vegetated Roofs/Modules/Walls
Detention Basins
☒ Extended/dry detention basin with grass/vegetated lining
☐ Extended/dry detention basin with impervious lining
Infiltration Basins
☒ Infiltration basin / RAIN GARDEN
☐ Infiltration trench
☐ Dry well
☐ Permeable Paving
☐ Gravel
☐ Permeable asphalt
☐ Pervious concrete
☐ Unit pavers, ungrouted, set on sand or gravel
☐ Subsurface reservoir bed
Wet Ponds or Wetlands
☐ Wet pond/basin (permanent pool)
☐ Constructed wetland
Filtration
☐ Media filtration
☐ Sand filtration
Hydrodynamic Separator Systems
☐ Swirl Concentrator
☐ Cyclone Separator
Trash Racks and Screens

Include Treatment Datasheet as Attachment E. The datasheet should include the following:	COMPLETED	NO
1. Description of how treatment BMP was designed. Provide a description for each type of treatment BMP.	X	
2. Engineering calculations for the BMP(s)	X	

Please describe why the selected treatment BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a detailed explanation.

SEE ATTACHED STORM WATER MANAGEMENT PLAN

MAINTENANCE

Please check the box that best describes the maintenance mechanism(s) for this project. Guidelines for each category are located in Chapter 5, Section 5.2 of the County SUSMP.

CATEGORY	SELECTED	
	YES	NO
First	X	
Second[1]	X	
Third[1]		X
Fourth		X

Note:

1. Projects in Category 2 or 3 may choose to establish or be included in a Stormwater Maintenance Assessment District for the long-term maintenance of treatment BMPs.

ATTACHMENTS

Please include the following attachments.

ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Site Map	X	
C	Relevant Monitoring Data	X	
D	LID and Treatment BMP Location Map	X	
E	Treatment BMP Datasheets	X	
F	Operation and Maintenance Program for Treatment BMPs	X	
G	Fiscal Resources	X	
H	Certification Sheet	X	
I	Addendum		X

Note: Attachments A and B may be combined.

STORM WATER MANAGEMENT PLAN

SALVATION ARMY DIVISIONAL
CAMP AND RETREAT CENTER

ER 98-14-023
MUP P70-379
SCH NO. 2000031058
RAMONA, CALIFORNIA

Prepared By:

Fuscoe Engineering
6390 Greenwich Dr. Ste 170
San Diego, CA 92122
(858) 554-1500

Prepared For:

The Salvation Army
2320 Fifth Avenue
San Diego, CA 92101

November 2009

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1.0 INTRODUCTION

This Storm Water Management Plan (SWMP) is required per the County of San Diego Storm Water and Discharge Control Ordinance Section 67.801 et seq. and the San Diego County SUSMP, which was revised in 2008. The purpose of this SWMP is to address water quality impacts in terms of the County of San Diego SUSMP standards. CASQA BMPs, as well as those outlined by the County of San Diego will be used to provide a long-term solution to water quality onsite. The property owner shall keep a master copy of this SWMP onsite at all times and update information within the SWMP as necessary. This SWMP is a living document and is subject to revisions as needed by the property owner.

The project shall comply with all applicable stormwater regulations at all times. The activities proposed by this project are subject to enforcement under permits from the San Diego Regional Water Quality Control Board (RWQCB) and the County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (Ordinance No. 9926), Stormwater Standards Manual, and Standard Urban Stormwater Mitigation Plan (SUSMP) and all other applicable ordinances and standards. This includes requirements for materials and wastes control, erosion control, and sediment control on the project site. In addition, this SWMP has been prepared to demonstrate that the project will comply with Low Impact Development (LID) requirements as applicable, to the satisfaction of the Director of Public Works.

1.1 PROJECT DESCRIPTION

This Storm Water Management Plan (SWMP) pertains to the proposed Salvation Army Divisional Camp and Retreat. It will discuss and analyze the potential pollutants and Best Management Practices (BMPs) to be implemented for the expansion of the current campsite located at 14488 Mussey Grade Road in Ramona, California. The campground is comprised of 578 acres located on the western side of Mussey Grade Road, south of State Route 67 (SR 67) and north of the San Vicente Reservoir.

The proposed project includes the expansion of the current camp site to an ultimate condition of accommodating 748 users. The proposed new facilities include four guest housing buildings, seven guest cabins, four tennis courts, one kitchen, two retreat/dining buildings, two restrooms, one maintenance building, one storage building, four staff housing buildings, one activities building, eleven educationsl cabins/classroom buildings/presentation areas, one multi-purpose building, one theater, two basketball courts, one canteen, one medical clinic, one administration building, and a swimming pool with a bathroom/shower building. The project will cluster the new facilities in order to minimize disturbance to the land, keeping the majority of the site undeveloped. The project is not an emergency project.

The majority of the site is characterized by steep, rugged terrain, with boulders and rock outcroppings interspersed with trees, shrubs and dense vegetation. The existing and proposed camp facilities are proposed within the generally more disturbed, more level terrain and buildable areas of the site. Currently, there are camp buildings and associated roads and improvement, several hiking trails, and a mounted cross in this mountainous terrain. The site is comprised primarily of southern mixed chaparral habitat. However, coast live oak and Engelmann oak riparian forests and woodlands; mule fat scrub; Diegan coastal sage scrub; non-native grassland; non-native woodland and mafic southern mixed chaparral habitats are also supported. The West Fork of the West Branch of the San Vicente Creek and some small tributaries are also located on the site.

The existing camping facility is located in the east-central portion of the property in the gentler, lower-lying areas. The buildings are generally rustic and low profile, with earth tone colors and exterior treatments that blend into the natural surroundings. Existing land uses include the following:

- Central dining facility (Ranch House);
- Two staff housing buildings;

o Small infirmary;
o Small canteen;
o Small office building;
o Trailer;
o Swimming pool with restroom and showers;
o Outdoor meeting area and forum;
o Maintenance building and yard;
o 10,000-gallon water tank;
o Five masonry cabins;
o Recreational playing fields;
o Retreat facility with a meeting hall (Lodge) and five cabins for guest housing; and, o Six semi-permanent dome-shaped tent structures (yurts) for camping.

The camp has an existing backbone infrastructure system that consists of a system of traditional wooden "T" power poles with 12 KiloVolt lines, a 10,000 gallon water tank and pump, a septic sewer system, and a network of private dirt, asphalt, and gravel roads. The site domestic water needs are serviced by Ramona Municipal Water District, and there are no High Risk Areas within the project limits.

The climate for the project area is typical of that of north San Diego County: moderate humidity, very little rainfall even in the rainy season, and typically sunny. According to the San Diego County Water Authority, the normal annual rainfall within the last 10 years (measured at Lake Henshaw approximately 14miles north of the site) is 25.29 inches per year. The rainfall for the area is 3.25 inches for the 100-year storm with a 6-hour duration.

Table 1: SUSMP Priority Project Categories

SUSMP PRIORITY PROJECT CATAGORIES	
Redevelopment that creates or adds at least 5,000 net square feet of additional impervious area.	✓
Residential Development of 10+ Units	
Commercial Dev. > 1 Acre	✓
Heavy Industry	
Industrial Development > 1 Acre	
Automotive Repair Shop	
Restaurants	✓
Hillside Developments > 5000 sq ft.	✓
Projects Directly Adjacent to ESAs which Create 2,500 sq ft of Impervious Area	
Parking Lots > 5,000 sq ft or > 15 spaces	✓
Streets, roads, highways, freeways, create new paved surface > 5000 sq ft.	✓
Retail Gasoline Outlets	

Note: According to Appendix A of the County of San Diego SUSMP, the project is located greater than 200' from the Environmentally Sensitive Areas which begin in the Fernbrook area. The project is therefore not considered "Directly Adjacent to" an ESA.

Table 2: Existing and Proposed Land Use Summary

EXISTING AND PROPOSED FACILITIES SUMMARY			
Item/Description	Existing Camp	Proposed Project	Existing + Proposed Project
Building Facility (sf)	33,570	190,750	224,320
Disturbed Area (ac)	35.4	78.1	113.5
Visitor Overnight Facilities (# of Users)	192	505	697
Employee Overnight Facilities (# of Users)	4	47	51
Standard Parking Spaces (#)	145	156	301
Overflow Parking Spaces (#)	32	80	112

Open space and low-density rural single-family housing generally surround the project site. Immediately north of the project are large lot residences and the commercial Golden Eagle West Horse Breeding Ranch, which provides horse breeding, shows, and retail sale of horses, and to the northeast and east of the site are existing homes (Figure 12). Areas to the south and southeast of the site are relatively undeveloped, to the west of the site is rugged, mountainous terrain and further to the east is the municipal boundary of the City of Poway.

Approximately three miles northeast of the site are the Santa Maria Valley and the town of Ramona, which are located in a low-lying area surrounded by mountainous and rugged terrain. The main north-south access in the area is provided by SR-67, Mussey Grade Road and Wildcat Canyon Road. Very few east-west improved roads exist. Many of the existing homes in the area have private roads with restricted access.

1.2 PROPOSED LAND USE SUMMARY

The proposed project is an expansion of the existing campground and proposed land uses are consistent with the existing land uses. The project proposes to construct access roads and parking areas along with additional employee and visitor overnight facilities. Other proposed buildings include a cafeteria, offices, and maintenance facilities. See Table 2 above for a summary of existing and proposed facilities for the project.

1.3 HYDROLOGIC UNIT CONTRIBUTION

According to the Regional Water Quality Control Board's (RWQCB) San Diego Hydrologic Basin Planning Area Map revised April 1995 (Appendix A), the project is located in the Fembrook Hydrologic Subarea of the San Vicente Hydrologic Area within the San Diego Hydrologic Unit (907.21) and comprises only 3.7% of the total hydrologic subarea, which is 15,622 acres.

The runoff from the project site is tributary to the West Branch of the San Vicente Creek, which runs west to east through the site, near the northern end of the site. Area 6 flows south and directly discharges to the West Fork. The remainder of the site, Areas 1-5, is directly tributary to the West Branch of the San Vicente Creek. The developed areas are a minimum of 2000 feet from the West Branch. See Appendix A for the project location on the RWQCB Basin Planning Map. Dry weather flow does not occur in the West Branch of the San Vicente Creek or other local natural drainage channels within the project site.

2.0 WATER QUALITY ENVIRONMENT

2.1 BENIFICIAL USES

The beneficial uses for the hydrologic unit are included on the following page. A description of the beneficial use categories is provided below.

MUN- Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
AGR- Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to , irrigation, stock watering, or support of vegetation for range grazing.
WARM-– Warm Freshwater Habitat: Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
AQUA- Includes the uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.
COMM- includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
BIOL- Includes uses of water that support designated areas or habitats, such as refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS) where the preservation or enhancement of natural resources requires special protection.
EST- Includes uses of water that support estuarine ecosystems, including but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g. estuarine mammals, waterfowl, or shorebirds.)
RARE- Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species, established under state or federal law as rare, threatened or endangered.
IND- Includes uses of water for industrial activities that do not depend primarily on water quality, including but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
SHELL- Includes uses of water that support habitats suitable for the collection of filter feeding shellfish (e.g. clams, oysters and mussels) for human consumption, commercial, or sport purposes.
MIGR- Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms such as anadromous fish.
MAR- Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g. marine mammals, shorebirds.)
GWR – Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting salt water intrusion into ground water aquifers.
REC1 – Contact Recreation: Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
REC2 – Non-Contact Recreation: Includes the uses of water for recreation involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
WILD – Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

2.1.1 INLAND RECEIVING WATERS

The West Branch of the San Vicente Creek is identified as beneficial for the following uses:

- MUN - municipal and domestic uses
- AGR - agricultural uses (fanning, horticulture, ranching, etc.)
- IND - industrial activities that depend primarily on water quality
- PROC - industrial activities not primarily dependent on water quality
- REC 1 - contact water recreation (swimming, wading, fishing, etc.)
- REC2 - non-contact water recreation (picnicking, hiking, sunbathing, etc.)
- WARM - warm freshwater habitat
- COLD - cold freshwater habitat
- WILD - wildlife habitat

The San Vicente Reservoir is identified as beneficial for the same uses as those listed above for the West Branch of the San Vicente Creek, with the exception that only fishing from shore or boat is permitted under the contact water recreation uses for the Reservoir. The distance from the downstream end of the project to the reservoir is approximately 3.4 miles. The ground water within the San Vicente Hydrologic Area is identified as beneficial for municipal and agricultural use.

2.1.2 303(D) STATUS

According to the California 2006 303d list published by the State Water Resources Control Board (SWRCB), the West Branch of the San Vicente Creek is not listed as a Section 303(d) receiving water. The San Vicente Reservoir is listed as a Section 303(d) receiving water for Chloride, Color, Manganese, pH (high), and Sulfates. The source of impairment is unknown for all of said pollutants. It shall be noted that the San Vicente Reservoir is approximately 3.4 miles from the project site, therefore no part of the proposed project site is within 200 feet of a 303(d) listed waterbody and the project is not required to use Advance Treatment BMPs. The Regional Board does not have any special requirements such as TMDLs or effluent limits for the project site.

2.2 REGULATORY FRAMEWORK

State Water Resources Control Board

In the State of California, the State Water Resources Control Board (SWRCB) and local Regional Water Quality Control Boards (RWQCBs) have assumed the responsibility of implementing US EPA's NPDES Program and other programs under the CWA such as the Impaired Waters Program and the Antidegradation Policy. The primary quality control law in California is the Porter-Cologne Water Quality Act (Water Code Sections 13000 et seq.). Under Porter-Cologne, the SWRCB issues joint federal NPDES Storm Water permits and state Waste Discharge Requirements (WDRs) to operators of municipal separate storm sewer systems (MS4s), industrial facilities, and construction sites to obtain coverage for the storm water discharges from these operations.

Basin Plan Requirement

In addition to its permitting programs, the SWRCB, through its nine RWQCBs, developed Regional Water Quality Control Plans (or Basin Plans) that designate beneficial uses and water quality objectives for California's surface waters and groundwater basins, as mandated by both the CWA and the state's Porter-Cologne Water Quality Control Act. Water quality standards are thus established in these Basin Plans and provide the foundation for the regulatory programs implemented by the state. The San Diego Basin RWQCB Basin Plan, which covers the project area, designates beneficial uses for surface waters and ground waters.

General Construction Permit

Dischargers whose projects disturb 1 or more acres of soil or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 99-08-DWQ). Effective July 1, 2010 all dischargers are required to obtain coverage under the Construction General Permit Order 2009-0009-DWQ adopted on September 2, 2009. Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility.Construction sites that qualify must submit a Notice of Intent (NOI) to gain permit coverage or otherwise be in violation of the CWA and California Water Code.

The GCP requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for each individual construction project greater than or equal to 1 acre of disturbed soil area. The SWPPP must list Best Management Practices (BMPs) that the discharger will use to control sediment and other pollutants in storm water and non-storm water runoff; the BMPs must meet the BAT and BCT performance standards. Additionally, the SWPPP must contain a visual monitoring inspection program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Section A of the Construction General Permit describes the elements that must be contained in a SWPPP."

The project includes over 1 acre of grading within the County of San Diego, and is therefore subject to the storm water discharge requirements of the GCP. The Project will require submittal of an NOI and preparation of a SWPPP prior to the commencement of soil disturbing activities. In the San Diego Region, where the Project resides, the SWRCB is the permitting authority, while the County of San Diego and San Diego RWQCB provide local oversight and enforcement of the GCP.

General MS4 Permit

In January 2007, the San Diego Region Water Quality Control Board issued the San Diego County Municipal Separate Storm Sewer System (MS4) Storm Water Permit (Water Quality Order No. R9-2007-0001. This NPDES permit was issued by the RWQCB to San Diego County, its municipalities and ports (referred to as Co-Permittees) for MS4 system discharges into waters of the United States.

Pursuant to the MS4 Permit, Co-Permittees are required to develop Jurisdictional Urban Runoff Management Plans (JURMP) designed to reduce the discharge of pollutants through their MS4s to the Maximum Extent Practicable (MEP).

Priority development projects within the County of San Diego jurisdiction are required to adhere to SUSMP development standards, which were developed by the County as an implementation plan designed to satisfy requirements outlined in R9-2007-0001 and the County of San Diego JURMP.

2.3 POTENTIAL POLLUTANTS

There is no sampling data available for the existing site condition. Neither Fuscoe Engineering nor the project applicant is aware of any contaminated or hazardous soils within the project area that would lead to special concerns regarding potential pollutants of concern. Table 3 below provides anticipated and potential pollutants for the project based on the SUSMP categories the project falls under.

Table 3: Anticipated and Potential Pollutants

ANTICIPATED AND POTENTIAL POLLUTANTS									
	SEDIMENT	NUTRIENTS	HEAVY METALS	ORGANIC COMPOUNDS	TRASH & DEBRIS	OXYGEN DEMANDING SUBSTANCES	OIL AND GREASE	BACTERIA & VIRUSES	PESTICIDES
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P(1)	X
Commercial Development	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Heavy Industrial Development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Steep Hillside Development	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Retail Gasoline Outlets			X	X	X	X	X		
Streets Highways and Freeways	X	P(1)	X	X(4)	X	P(5)	X		

Notes:
X = Anticipated
P= Potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons
(5) Including solvents

According to Table 3, which was taken from the County of San Diego SUSMP Manual Table 3.1, the designations of Commercial Development, Restaurants, Steep Hillside Development, Parking Lots, and Streets, Highways and Freeways, have anticipated or potential pollutants consisting of sediment, nutrients, heavy metals, organic compounds, trash & debris, oxygen demanding substances, oil & grease, bacteria & viruses, and pesticides.

In examining these anticipated and potential pollutants, the proposed project has the potential to be a source of pollutants based on typical land use designation. However due to the spread-out nature of the development, it is anticipated that there will be a decreased intensity of pollutant loading for the proposed project as compared to typical projects.

The canteen proposed with the project is a very small camp store that would provide basic provisions for camp users. No additional parking, loading, hazardous materials areas, etc. are associated with this use. The infirmary proposed with the project will involve application of first aid to camp visitors with relatively minor (e.g. headaches, cuts and scrapes, sunburn, insect bites) ailments, and would not involve the generation of hazardous medical wastes. The operation of either the canteen or the infirmary will not involve uses that represent potential water quality impacts and no additional impacts are associated with these uses.

The use of herbicides is not anticipated for the project; however the potential exists for herbicides (specifically weed killer) to be used in small quantity on site. In the unlikely event that herbicides are used on site, they will be used in accordance with standard application practices, which will not affect water quality. The use of pesticides is not anticipated with this project.

Due to the fact that, according to County of San Diego definitions given in the SUSMP, the project does not discharge directly to a 303(d) listed waterbody, there are no Primary Pollutants of Concern for the project and all potential pollutants listed above are considered Secondary Pollutants of Concern.

2.4 SOIL CHARACTERISTICS

The project site is located within the San Vicente Reservoir map for San Diego County. Based on the US Department of Agriculture's Soil Survey of San Diego County (1973), the site is comprised of eight different types of soil. Approximately 75% of the site is made up of CmrG (Cieneba very rocky coarse sandy loam, 30-75% slopes) and CmE2 (Cieneba rocky coarse sandy loam, 9-30% slopes). Both of these soil types are a high to very high erosion hazard. The next largest soil type, approximately 11 % of the site, is CID2 (Cieneba coarse sandy loam, 5-15% slopes) which is a slight to moderate erosion hazard. The remainder of the soils types are FeE (Fallbrook rocky sandy loam, 9-30% slopes), VsC (Vista coarse sandy loam, 5-9% slopes), VaC (Visalia sandy loam, 5-9% slopes), VaB (Visalia sandy loam, 2-5% slopes), and AvC (Arlington coarse sandy loam, 2-9% slopes). All of these soils are a slight or slight to moderate erosion hazard, except FeE which is a moderate to high erosion hazard. See Appendix C for USDA soil map.

Table 4 on the following page provides soil characteristics for each soil type pertaining to soil classification, permeability, and erodibility. A rain garden is proposed in Area 2 as an infiltration BMP and will be located in an area of CID2 soils, which are classified as having rapid permeability by the USDA Soil Survey. The feasibility of the rain garden is discussed fully in Attachment E of this report.

Table 4: Soil Characteristics

SOIL CHARACTERISTICS			
Soil Type	**Classification**	**Permeability**	**Erodibility**
AvC	C	Slow	Severe
CmrG	B	Rapid	Severe
CmE2	B	Rapid	Severe
ClD2	B	Rapid	Severe
FeE	C	Slow	Severe
VaB	B	Moderate	Severe
VaC	B	Moderate	Severe
VsC	B	Moderately Rapid	Moderate

Based on the proposed site layout, the majority of the CmrG and CmE2 areas will be left undisturbed. These areas are more rocky and have greater slopes. Most of the site improvements will occur in the flatter areas within the remainder of the soil types listed above. In order to mitigate any potential increase in erosion, all disturbed areas will be landscaped as shown in the architectural and landscape plans. In addition, all steep roads will be built with asphalt berms to mitigate any erosion that may occur parallel to the cut roads. No increase in erosion on site is expected as a result of this project.

As discussed in hydrologic conditions section beginning on the following page and depicted in the grading plans in Appendix B, detention basins will be used to detain flows such that post-development discharges match pre-development conditions. Detention basins will also be designed with riprap to decrease the discharge velocity. No changes in downstream erosion potential are anticipated.

The project proposes septic systems with leach fields. A separate report has been prepared analyzing these systems. The leach fields will be designed and constructed in accordance with County of San Diego DEH standards at the time of final engineering. Therefore, impact from the leach fields on the groundwater or surface water is not anticipated.

3.0 HYDROLOGIC CONDITIONS/HYDROMODIFICATION

County of San Diego SUSMP requirements state that a change to a priority project site's hydrologic regime would be considered a condition of concern if the change would impact downstream channels and habitat integrity. In addition, priority development projects disturbing over 50 acres in area are subject to Interim Hydromodification Criteria. This criterion requires that post project runoff rates and durations not exceed pre-project runoff rates and durations, where the increased flow rates will result in increased potential for erosion or other significantly adverse impacts to beneficial uses, attributable to changes in flow rates and durations. The proposed project will disturb 22.7 acres of land and is therefore not subject to the Interim Hydromodification Criteria.

The SUSMP also states that if practicable, priority development projects shall control post-development peak storm water runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion and that project should control runoff discharge volumes and durations to the maximum extent practicable using the site design, source control, and treatment control requirements.

Runoff coefficients (C) for the rational method analysis were determined for each subarea based upon the Hydrologic Soil Group (HSG) of the underlying soil as well as the land use pertaining to the conditions under consideration. Hydrologic Soil Groups for each sub-basin were taken from the USDA Soils Survey Maps, provided in Attachment C.

The Hydrology Study completed for the project fully discusses hydrologic aspects of the proposed project. Said study determined existing and proposed runoff flow rates for the 100-year storm event and

sized detention basins to attenuate peak flows after development such that they will be at or below pre-project conditions. For calculation of 100-year rates of runoff and sizing for the detention basins, please see the hydrology study prepared by Nasland Engineering.

Through the inclusion of the detention basins into the project design, post-project flow rates will not be greater than the pre-project condition. At the time of final engineering, the basin outlet structures will be designed such that 2-year and 100-year discharge rates will not increase as a result of the project. In addition, the basins will also serve as extended detention basins for the project and be designed to provide a detention time between 24 and 72 hours for the 85th Percentile Storm Event for each detention basin.

Therefore, the detention basins are determined to adequately attenuate project flows such that hydrologic conditions of concern will not occur and the project will not increase runoff flow rates in a manner that will lead to a significant increase in downstream erosion or loss of habitat.

4.0 CONSTRUCTION PHASE POLLUTANTS/BMPS

Clearing, grading, excavation and construction activities associated with the project may impact water quality due to sheet erosion of exposed soils and subsequent deposition of particulates in local drainages. Grading activities, in particular, lead to exposed areas of loose soil, as well as sediment stockpiles, that are susceptible to uncontrolled sheet flow. Although erosion occurs naturally in the environment, primarily from weathering by water and wind action, improperly managed construction activities can lead to substantially accelerated rates of erosion that are considered detrimental to the environment.

In addition to erosion and sedimentation, the use of materials such as fuels, solvents, and paints also presents a risk to surface water quality. Improperly managed construction materials can lead to the possibility for exposure of potential contaminants to precipitation. When this occurs, these constituents become visible and/or non-visible pollutants entrained in storm water runoff. If they are not intercepted or left uncontrolled, the polluted runoff would otherwise freely sheet flow through the downstream desert washes and can cause pollution accumulation concerning groundwater infiltration. A list of common construction materials and their associated construction activity are provided in the table below.

CONSTRUCTION ACTIVITY	CONSTRUCTION SITE MATERIAL	VISUALLY OBSERVABLE?
Paving	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension
	Asphalt Emulsion	
	Liquid Asphalt (tack coat)	
	Cold Mix	
	Crumb Rubber	Yes – Black, solid material
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension
Cleaning	Acids	No
	Bleaches	
	Detergents	Yes - Foam
	Solvents	No
Concrete Work	Portland Cement (PCC)	Yes - Milky Liquid
	Masonry products	No
	Sealant (Methyl Methacrylate - MMA)	No
	Incinerator Bottom Ash, Bottom Ash, Steel Slag, Foundry Sand, Fly Ash, Municipal Solid Waste	No
	Mortar	Yes - Milky Liquid
	Concrete Rinse Water	Yes - Milky Liquid
	Non-Pigmented Curing Compounds	No
Landscaping	Aluminum Sulfate	No
	Sulfur-Elemental	
	Fertilizers	
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity
	Herbicide, Pesticide	No
	Lime	

CONSTRUCTION ACTIVITY	CONSTRUCTION SITE MATERIAL	VISUALLY OBSERVABLE?
Painting	Paint	Yes
	Paint Strippers	No
	Resins	
	Sealants	
	Solvents	
	Lacquers, Varnish, Enamels, and Turpentine	
	Thinners	
Portable Toilet Facilities	Portable Toilet Waste	Yes
Line Flushing	Chlorinated Water	No
Adhesives	Adhesives	No
Dust Control	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No
Vehicle Maintenance	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid
	Batteries	No
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor
Soil Amendment/Stabilization	Polymer/Copolymer	No
	Straw/Mulch	Yes - Solids
	Lignin Sulfonate	No
	Psyllium	
	Guar/Plant Gums	
	Gypsum	
Wood (Treated) Work	Ammoniacal-Copper-Zinc-Arsenate, Copper-Chromium-Arsenic, Ammoniacal-Copper-Arsenate, Copper Naphthenate	No
	Creosote	Yes - Rainbow Surface or Brown Suspension
Source: Caltrans SWPPP Attachment S, March 2003		

Prior to the issuance of a development permit, the applicant shall provide evidence that the development of the Project shall comply with the GCP and associated local NPDES regulations to ensure that the potential for soil erosion is minimized on a project-by-project basis. Also, in accordance with standard County project permitting and approval procedures, a NOI for coverage of projects under the GCP will be filed with the SWRCB prior to the issuance of a grading permit (projects one acre or greater of soil disturbance).[1] Accordingly, a SWPPP will be prepared and implemented at the project site, and revised as necessary, as administrative or physical conditions change. The San Diego RWQCB, upon request, must instruct the developer to make the SWPPP available for public review. The SWPPP will describe Best Management Practices (BMPs) that address pollutant source reduction and provide measures/controls necessary to mitigate potential pollutant sources. These include, but are not limited to: erosion controls, sediment controls, tracking controls, non-storm water management, materials & waste management, and good housekeeping practices.[2] The above-

[1] Any dewatering activities associated with construction must be in accordance with applicable RWQCB and local agency dewatering permits, as well.

[2] California BMP Handbook for Construction (2003): http://www.cabmphandbooks.com/Construction.asp

mentioned BMPs for construction activities are discussed further below, BMPs given on the following pages make references to the standard BMP details provided in the California BMP Handbook, prepared by the California Storm Water Quality Association (CASQA).

Erosion Controls

Erosion Control, also referred to as soil stabilization, is a source control measure that is designed to prevent soil particles from detaching and becoming transported in the storm water runoff. Erosion Control BMPs protect the soil surface by covering and/or binding the soil particles. The scheduling of soil disturbing activities should be minimized during the wet season. If such activities occur in the wet season, all exposed slopes or areas with loose soil will be stabilized. This may involve the application of soil binders, or geotextiles and mats. Temporary earth dikes or drainage swales may also be employed to divert runoff away from exposed areas and into more suitable locations. If implemented correctly, erosion controls can effectively reduce the sediment loads entrained in storm water runoff from construction sites. Below is a list of approved construction BMPs that can be implemented for the proposed Project's SWPPP.

Erosion Controls

EC-1 Scheduling
EC-2 Preservation of Existing Vegetation
EC-5 Soil Binders
EC-6 Straw Mulch
EC-7 Geotextiles and Mats
EC-8 Wood Mulching
EC-9 Earth Dikes and Swales
EC-10 Velocity Dissipation Devices
EC-11 Slope Drains

Sediment Controls

Sediment controls are structural measures that are intended to complement and enhance the soil stabilization/erosion control measures and reduce sediment discharges from construction areas. Sediment controls are designed to intercept and filter out soil particles that have been detached and transported by the force of water. In addition, silt fencing should be installed along the perimeter of the site where sheet flows discharge from the site, and should also be placed around areas of soil disturbing activities, such as grading or clearing. Check dams or chevrons should be situated in areas where high velocity runoff is anticipated. Gravel bag berms or fiber rolls should be used to intercept sheet flows or at the toe of slopes to minimize sediment mobilization. Street sweeping should also be scheduled in areas where sediment can be tracked from the project site onto paved streets or roads. Below is a list of approved construction BMPs that can be implemented for the proposed Project's SWPPP.

Sediment Controls

SE-1 Silt Fence
SE-2 Desilting Basin
SE-3 Sediment Trap
SE-4 Check Dam
SE-5 Fiber Rolls
SE-6 Gravel Bag Berm
SE-7 Street Sweeping
SE-8 Sandbag Barrier
SE-9 Straw Bale Barrier
SE-10 Chemical Treatment
SE-11 Chemical Treatment

Tracking Controls

The proposed project site will stabilize all construction entrance/exit points to reduce the tracking of sediments onto paved streets and roads by construction vehicles. Construction roadways should also be stabilized to minimize off-site tracking of mud and dirt. Wind erosion controls should be employed in conjunction with tracking controls. Below is a list of approved construction BMPs that can be implemented for the proposed Project's SWPPP.

Tracking Controls

TC-1 Stabilized Construction Entrance / Exit
TC-2 Stabilized Construction Roadway
TC-3 Entrance / Outlet Tire Wash
WE-1 Wind Erosion Control

Non-Storm Water Management

The Statewide NPDES Permit defines non-storm water discharges as follows: "Non-storm water discharges consist of all discharges from a municipal storm water conveyance which do not originate from precipitation events (i.e., all discharges from a conveyance system other than storm water)." Paving and grinding operations should be avoided during the wet season, where possible. Illegal connections and dumping incidents on the construction site, especially at or near storm drain inlets, will be promptly reported and cleaned up at the earliest opportunity. Vehicle equipment cleaning, fueling, and maintenance should be conducted in designated areas that are adequately protected and contained. Spill kits should also be readily available in these designated areas. Below is a list of approved construction BMPs that can be implemented for the proposed Project's SWPPP.

Non-Storm Water Management Controls

NS-1 Water Conservation Practices
NS-2 Dewatering Operations
NS-3 Paving and Grinding Operations
NS-4 Temporary Stream Crossing
NS-5 Clear Water Diversion
NS-6 IC/ID Detection and Reporting
NS-7 Potable Water / Irrigation
NS-8 Vehicle & Equipment Cleaning
NS-9 Vehicle & Equipment Fueling
NS-10 Vehicle & Equipment Maint.
NS-11 Pile Driving Operations
NS-12 Concrete Curing
NS-13 Concrete Finishing
NS-14 Material Use Over Water
NS-15 Demolition Over Water
NS-16 Temporary Batch Plants

Materials and Waste Management

Waste management consists of implementing procedural and structural BMPs for collecting, handling, storing and disposing of wastes generated by a construction project to prevent the release of waste materials into storm water discharges. All materials with the potential to contaminate storm water runoff should be delivered and stored in designated areas with secondary containment measures (i.e. covered and bermed). Chemicals, drums, and bagged materials should not be stored directly on soil, but instead be on pallets. Personnel should also be trained on the proper use of these materials. Stockpiles of sediment should be stored in areas away from drainage courses and concentrated flows of runoff. A temporary barrier around stockpiles should also be installed and a cover provided during the rainy season. Spill cleanup procedures and kits should be made readily available near hazardous materials and waste. Solid wastes, such as trash and debris, should be collected on a regular basis and stored in designated areas. Concrete and paint washout areas should be installed and properly maintained in areas conducting the associated activities. Below is a list of approved construction BMPs that can be implemented for the proposed Project's SWPPP.

Waste Management and Materials

WM-1 Material Delivery & Storage
WM-2 Material Use
WM-3 Stockpile Management
WM-4 Spill Prevention and Control
WM-5 Solid Waste Management
WM-6 Hazardous Waste
WM-7 Contaminated Soil
WM-8 Concrete Waste
WM-9 Sanitary / Septic Waste

Monitoring Program

A monitoring program will also be included in the SWPPP that outlines storm event inspections of the site and a sampling plan in accordance with the GCP. "The goals of [the program] are (1) to identify areas contributing to a storm water discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed, and functioning in accordance with the terms of the General Permit; and (3) whether additional control practices or corrective maintenance activities are needed." If a discharge is observed during these inspections, a sampling and analysis of the discharge is required.

Sampling and Analysis

"Any breach, malfunction, leakage, or spill observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water shall trigger the collection of a sample of discharge...The goal of the sampling and analysis is to determine whether the BMPs employed and maintained on site are effective in preventing the potential pollutants from coming in contact with storm water and causing or contributing to an exceedance of water quality objectives in the receiving waters." In any case of breakage and potential for non visible pollution, sampling and analysis will be required to ensure that the beneficial uses of downstream receiving waters are protected. In addition, sampling is required for any site which directly discharges runoff into a receiving water listed in the Attachment 3 of the GCP listed as impaired for sedimentation.

5.0 POST CONSTRUCTION BMPS

5.1 SITE DESIGN BMPS

The project is designed to include LID Site Design BMPs which reduce runoff, prevent storm water pollution associated with the project, and conserve natural areas onsite. The site design principles outlined in the County of San Diego SUSMP Manual are listed below.

STEP 1: MAINTAIN PRE-DEVELOPMENT RAINFALL RUNOFF CHARACTERISTICS

DESIGN CONCEPT	DESCRIPTION
MINIMIZE IMPERVIOUS FOOTPRINT	The width of parking areas, sidewalks and private roads have been kept to the minimum required. In addition, the number of street cul-de-sacs has been minimized and landscaped areas have been incorporated to reduce their impervious cover. Where possible, proposed roadways and parking areas are proposed to be constructed with native granular soils and existing unpaved roadways are proposed to remain unpaved unless otherwise required by the fire department.
CONSERVE NATURAL AREAS	A vast amount of open space will be preserved for the project area.
MIMIMIZE DCIAS (DIRECTLY CONNECTED IMPERVIOUS AREAS)	Vegetated swales, extended detention basins, cisterns receiving roof runoff, and rain gardens are proposed onsite. In total, the project proposed minimal DCIAs, and has a significant amount of water quality features designed to minimize "hard piping" to storm drain. Where landscaping is proposed, the project will drain rooftops, sidewalks, walkways, and other impervious areas into landscaping where feasible. This will be designated and designed upon final engineering.

STEP 2: PROTECT SLOPES AND CHANNELS
Slopes located in the open space areas will be predominately undisturbed by the proposed project. Proposed slopes will be adequately vegetated and stabilized during and after construction. Runoff will be routed away from the top of steep slopes. Where possible, proposed construction is located outside of existing channels.

Project specific Site Design BMPs proposed include the following:

1. The proposed site expansion has been significantly reduced to leave more undisturbed land and natural water quality treatment.
2. Development within steep slope and high erosion areas has been avoided to the extent feasible in the site plan to minimize any potential erosion.

3. Approximately 30% of the site, at the western end of the site, is being dedicated as open space easement. This guarantees that this area will remain undeveloped and natural.
4. Landscape is provided around much of the disturbed areas to act as natural water quality treatment facilities.
5. Runoff from Area 1 will be captured at various points by drainage pipes and released toward natural open space. This travel through open space allows for natural water quality treatment, as emphasized by the County. In addition, the flow will be spread out to decrease the discharge velocity. See Appendix B, Civil Grading Plans for Area 1 for drainage flows.
6. Runoff in Areas 2-6 will be directed toward vegetated swales which will also provide natural water quality treatment. See Appendix B, Civil Grading Plans for swale locations.
7. The overflow parking in Area 5 will be constructed of decomposed granite to decrease the amount of impervious area on site.
8. Riprap will be placed at detention basin outlet points to dissipate energy.
9. Native species will be used as much as possible in landscaping to limit the amount of irrigation and fertilizers required.

5.2 LOW IMPACT DEVELOPMENT DESIGN CONCEPTS

1. Conserve natural Areas, Soils, and Vegetation-County LID Handbook 2.2.1

LID DESIGN CONCEPT	DESCRIPTION
Preserve well draining soils (Type A or B)	There are Type B Soils located throughout the majority of the site. The only location of Type C soils is in the southeast portion of the site where Area 1 and the southwesterly portion of Area 2 are located. See attachment C for relevant information from the USDA Soil Maps. Where feasible, locations of Type B soils are being preserved.
Preserve Significant Trees	A large number of significant trees will be preserved as the vast majority of the property will remain undisturbed.
Other. Description:	All natural vegetation and habitats will be preserved in areas that are to remain undisturbed.

2. Minimize Disturbance to Natural Drainages-County LID Handbook 2.2.2

LID DESIGN CONCEPT	DESCRIPTION
Set-back development envelope from drainages	Development will not be located in areas of major drainage.
Restrict heavy construction equipment access to planned green/open space areas.	Heavy construction equipment will not be permitted to encroach upon open space areas unless it is unavoidable regarding the construction of a portion of the proposed project.
Other: Description	

3. Minimize and Disconnect Impervious Surfaces (see 5) -County LID Handbook 2.2.

LID DESIGN CONCEPT	DESCRIPTION
Clustered Lot Design	The proposed project has clustered areas of development in order to preserve natural areas. Please see the project grading plans/site map in Attachment B and SWMP Exhibits/BMP location maps in Attachment D regarding the clustering of development on the proposed greater project site.
Items checked in 5?	Yes- See Below.
Other. Description:	
Not Feasible: State Reason	

4. Minimize Soil Compaction-County LID Handbook 2.2.4

LID DESIGN CONCEPT	DESCRIPTION
Restrict heavy construction equipment access to planned green/open space areas.	Heavy construction equipment will not be permitted to encroach upon open space areas unless it is unavoidable regarding the construction of a portion of the proposed project.
Re-till soils compacted by construction vehicles/equipment	It is not anticipated that construction vehicles will impact a significant amount of area which is designated as pervious. If areas designated for water quality treatment or landscaping, etc, are significantly compacted as to impair the function of the proposed use, it will be remedied through tilling or equivalent means.
Collect & re-use upper soil layers of development site containing organic materials	This will be determined upon final engineering. If the upper layers or soil are useable, they will be reused where applicable onsite.
Not feasible. State Reason:	

5. Drain Runoff from Impervious Surfaces to Pervious Areas-County LID Handbook

LID DESIGN CONCEPT	DESCRIPTION
LID Street & Road Design Curb-cuts to landscaping ✓ Rural Swales Concave Median ✓ Cul-de-sac Landscaping Design Other. Description:	Rural swales will be employed throughout the project side along roadways, where steepness of roadway permits their use. Cul-de-sac landscaping design will be employed in Area 5/6A. Curb cuts are not applicable to the project due to little use of curb along roadways.

LID DESIGN CONCEPT	DESCRIPTION
LID Parking Lot Design ✓ Permeable Pavements Curb-cuts to landscaping ✓ Other. Description:	Parking areas are proposed to use native granular material. Curb cuts are not applicable to the project due to no use of curb in parking areas. A Rain Garden is proposed in parking area in Area 2.
LID Driveway, Sidewalk, Bike-path Design ✓ Permeable Pavements ✓ Pitch pavements toward landscaping ✓ Other. Description:	Very few driveways and sidewalks are proposed with the project. However walkways/paths/trails will be constructed from native granular material and/or DG. Where feasible, walkways will be pitched to landscaping.
LID Building Design ✓ Cisterns & Rain Barrels ✓ Downspout to swale Vegetated Roofs Other. Description:	Cisterns are proposed to accept roof runoff from all new buildings. Where it is not feasible to direct downspouts to cisterns, downspouts will be directed to discharge to vegetated swales.
LID Landscaping Design Soil Amendments ✓ Reuse of Native Soils Smart Irrigation Systems Street Trees ✓ Other. Description: 5. Not feasible. State Reason:	Native soils will be reused for landscaping planting material. Native species and drought tolerant species will be used in landscaping design.

5.3 SOURCE CONTROL BMPS

"Source control BMP (both structural and non-structural)" means land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source Control BMPs minimize the contact between pollutants and urban runoff. The source control principles outlined in the County of San Diego SUSMP Manual are listed below.

STEP 3: PROVIDE STORM DRAIN STENCLING AND SIGNAGE
Storm Drain Stenciling will read: "No Dumping- I Live Downstream" or equivalent message as desired by the County of San Diego. Signs with prohibitive language to prohibit dumping will be posted at public points of access to channels and creeks.

STEP 4: DESIGN OUTDOOR MATERIAL STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION
Any hazardous material storage associated with any portion of the project site will be stored inside, protected from precipitation as well as run-on from adjacent areas. Storage areas will be paved to contain leaks and spills. Under no circumstances shall materials with the potential for storm water contamination be stored outside.

STEP 5: DESIGN TRASH STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION
Any trash storage area shall be on impervious ground; walled and covered to prevent contact from precipitation and run-on. Any spills or leaks of trash will be contained within the trash enclosure.

STEP 6: USE EFFICIENT IRRIGATION SYSTEMS AND LANDSCAPE DESIGN
Efficient irrigation systems will be designed to each landscaped area's specific water requirements Landscaping design which uses as much native landscaping as possible will be used, as well as drought tolerant plant species.

STEP 7: INCORPORATE REQUIREMENTS APPLICABLE TO INDIVIDUAL PROJECT CATAGORIES	
PRIVATE ROADS	The proposed project will utilize roadside rural swale system.
PARKING AREAS	Landscape areas will be incorporated to the drainage design.
RESIDENTIAL DRIVEWAYS	Project does not propose residential driveways, however access drives proposed with the project will drain into landscaping.
HILLSIDE LANDSCAPING	Hillside areas will be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, satisfactory to the County of San Diego.

Project specific Source Controls are more fully described below:

1. Employees of the camp/retreat site will receive training regarding the proper disposal of chemicals and grease, swimming pool water, landscape debris, and litter.
2. When the swimming pool is emptied, discharge water will be de-chlorinated with a de-chlorination kit to less than one PPM chlorine, as stated in Section 67.806 of Ordinance No. 9424. When the filters are cleaned or backwashed, the water will go into a septic tank that leaches into the ground. The amount of water associated with backwashing the filters is relatively small and can be handled by the camp's leach fields.
3. Swimming pool chemicals will be stored in a locked, gated area in secondary containment wells. The wells protect against potential leaks. The chemicals themselves are stored in plastic covered drums.
4. Grease traps will be constructed with the kitchen to limit any pollution from excess grease.
5. The litter in the various site trash cans will be emptied after each meal and disposed of in the large, covered dumpsters. General grounds maintenance will occur at least once a week. During that time, the maintenance staff will remove any trash left on the camp ground.
6. The managerial staff will conduct a review of the facilities periodically to ensure the BMPs are being practiced and are functioning effectively.
7. The majority of vehicle maintenance will be minor, such as changing spark plugs and oil. Major vehicle repairs and maintenance will done off-site at an auto facility. Vehicles and equipment will be maintained and serviced per the guidelines set forth in the County of San Diego's Storm Water Standards Manual.
8. Landscape debris will be disposed of in covered trash receptacles.
9. Absorbent rags are kept readily accessible in the maintenance areas for spill response.
10. Asphalt paved roadways and/or parking areas will be swept using street sweepers or manually. Only dry methods will be allowed. Sweeping of parking areas and/or roadways paved with asphalt will occur monthly during the first year after the project is completed. At that time, frequency of sweeping will re-considered and adjusted (either more or less frequently) as site conditions require.

11. Two five-gallon covered buckets are located on site which store waste oil and used oil filters for proper disposal and recycling. Secondary containment, sized to 110% of capacity will be provided for the covered buckets. Proper handling and disposal of these buckets will be performed by staff.
12. The San Diego County Department of Environmental Health (DEH) requires a Business Plan for businesses which use, handle, or store more than 55 gallons of hazardous substance. The Business Plan contains basic information about the location, type, quantity, and health risks of the hazardous materials stored, used or disposed of by a business. The Salvation Army currently has a Business Plan for the two above ground fuel storage tanks (Hazardous Materials Business Plan H35642). The existing Business Plan will be amended and approved by DEH prior to any activity involving the tanks. Upgrades to the tanks will be performed if determined necessary by the DEH or any other governing agency.
13. Since the site has a business plan, DEH will visit the site twice a year to inspect for compliance with regulations. In addition, the business plan is reviewed every three years.
14. Fuel tanks are fueled by the Ramona Oil Company, Inc., an industry professional.
15. Prior to relocating the tanks, consultation with the Ramona Fire Department is required regarding specific tank details.
16. AmeriGas maintains the propane gas tanks on site. They are checked bi-monthly by AmeriGas personnel. If a leak is noticed, AmeriGas will repair the leak.
17. Chemicals and maintenance materials such as paint thinners and acetone will be stored in the supply storage building in the maintenance area, Area 5, under cover. This cover will limit any possible contact with runoff and storm water. Chemicals and maintenance material storage areas will include provision for secondary containment, sized to 110% of capacity.
18. All maintenance activities will be performed in the new maintenance building, under cover also. Materials and waste will be kept indoors and disposed of properly in waste containers.
19. Fuel tanks are fitted with a secondary containment product, sized to 110% capacity.
20. Proper cleaning of canteen.
21. Proper disposal of waste from the infirmary.
22. Employ Integrated Pest Management Principles:
    1. The need for pesticide use in the project design will be eliminated and/or reduced by:
        a. Planting pest-resistant or well-adapted plant varietals such as native plants
        b. Discouraging pests by designing the site and landscape to employ pollution prevention as a first-line of defense.

Non-retail fuel dispensing areas (should any be incorporated into the project) shall comply with SUSMP Section 4.2 Principal 7.j and contain the following:

1. Overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be rouoted to prevent drainage across the fueling area. The fueling area shall drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.
2. Paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited.
3. Have an appropriate slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of runoff from surrounding areas.
4. At a minimum, the concrete fuel dispensing area must extend 6.5 feet from the comer of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less.

When the swimming pool is emptied, discharge water will be de-chlorinated with a dechlorination kit to less than 1 PPM chlorine, as stated in Section 67.806 of Ordinance No. 9424. When the filters are cleaned or backwashed, the water will discharge to a septic tank that leeches into the ground. The amount of water associated with backwash of filters is relatively small and can be handled by the camp's leech fields.

Storage of hazardous materials shall meet SUSMP Source Control BMPs Section 4.2 Principal 4 as follows:

1. Hazardous materials with the potential to contaminate urban runoff shall either be: (a) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (b) protected by secondary containment structures such as berms, dikes or curbs.
2. The storage area shall be paved and sufficiently impervious to contain leaks and spills.
3. The storage area shall have a roof or awning to minimize direct precipitation within the secondary containment area.

5.4 TREATMENT CONTROL BMPS

Runoff from the proposed site will flow from the project site via swales toward the proposed treatment control BMPs (extended detention basins). Based on the treatment matrix located in the County of San Diego SUSMP Manual located in Section 2.3, it is concluded that the does not consist of any primary pollutants of concern. Nutrients, Pesticides, Sediment, Heavy Metals, Organic Compounds, Trash & Debris, Oxygen Demanding Substances, Bacteria & Viruses, and Oil & Grease are secondary pollutants of concern for the project.

Table 5: Pollutant Removal Characteristics

SITE POLLUTANTS OF CONCERN REMOVAL CHARACTERISTICS			
	COURSE SEDIMENT AND TRASH	POLLUTANTS THAT TEND TO ASSOCIATE WITH FINE PARTICLES DURING TREATMENT	POLLUTANTS THAT TEND TO BE DISSOLVED FOLLOWING TREATMENT
SEDIMENT	X	X	
NUTRIENTS		X	X
HEAVY METALS		X	
ORGANIC COMPOUNDS		X	
TRASH AND DEBRIS	X		
OXYGEN DEMANDING SUBSTANCES		X	
BACTERIA		X	
OIL & GREASE		X	
PESTICIDES		X	

From Table 5, which is taken from the County SUSMP Table 4.3, it is concluded that all of the site pollutants of concern can either be described as "Coarse Sediment and Trash" or as "Pollutants That Tend to Associate with Fine Particles During Treatment". In addition, nutrients also behave as "Pollutants That Tend to be Dissolved Following Ttreatment". For dissolved pollutants, the most effective method of control is site design and source control. Through the employment of the previously mentioned site design and source control BMPs (specifically use of native vegetation, low use of fertilizer, and use of phosphate-free fertilizer), the introduction of nutrients into runoff will be minimized to the extent practicable. Treatment Control BMPs will therefore be required to provide effective removal of pollutants characterized as "Coarse Sediment and Trash" or as "Pollutants That Tend to Associate with Fine Particles During Treatment". The County of San Diego defines the acceptable level of treatment being removal efficiencies of deemed to be "Medium" or "High".

TREATMENT CONTROL BMP:	YES	N/A	DESCRIPTION
BIORETENTION FACILITIES	☐	☒	Rain Garden proposed in Area 2 will provide some incidental biological uptake of pollutants, but it will primarily serve as an infiltration BMP.
SETTLING BASINS AND WETLANDS	☒	☐	Extended detention basins are utilized due to their ability for settling, filtration, uptake, and absorption of pollutants to vegetative material.
INFILTRATION FACILITIES OR PRACTICES	☒	☐	Rain Garden in Area 2 will be designed as an infiltration BMP.
MEDIA FILTERS	☐	☒	Not Used. Alternative Extended Detention Basins are utilized onsite.
HIGH RATE BIOFILTERS	☒	☐	Site Design/LID Grass swale bio-filters are utilized throughout the project in order to provide treatment for street, building, and parking area runoff. See Section 5.2 for details concerning the treatment. Additionally, the vegetated swale proposed for the maintenance area in Area 5 will provide treatment control in accordance with Appendix F of the County SUSMP.
HIGH RATE MEDIA FILTERS	☐	☒	Not Used. Alternative Extended Detention Basins are utilized onsite.
DRAINAGE INSERTS	☐	☒	Will be used in catch basins near fueling areas in addition to other means as a spill control measure, but is not proposed as a storm water treatment control BMP for the project.

Treatment Control BMP Datasheets are provided in Attachment E describing how the BMPs were designed and engineering calculations for the BMPs. The treatment control BMP removal efficiencies as outlined by the County of San Diego SUSMP Table 4.2 are provided on the following page.

Table 6: Pollutant Removal Efficiencies

TREATMENT CONTROL BMP SELECTION MATRIX								
	BIORETENTION FACILITIES (LID)	SETTLING BASINS (DRY PONDS)	WET PONDS AND WETLANDS	INFILTRATION FACILITIES OR PRACTICES	MEDIA FILTERS	HIGH RATE BIOFILTERS	HIGH RATE MEDIA FILTERS	TRASH RACKS AND HYDRODYNAMIC DEVICES
COURSE SEDIMENT AND TRASH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
POLLUTANTS THAT TEND TO ASSOCIATE WITH FINE PARTICLES DURING TREATMENT	HIGH	HIGH	HIGH	HIGH	HIGH	MEDIUM	MEDIUM	LOW
POLLUTANTS THAT TEND TO BE DISSOLVED FOLLOWING TREATMENT	MEDIUM	LOW	MEDIUM	HIGH	LOW	LOW	LOW	LOW

As previously mentioned, pollutants for the project that are to be managed through the use of treatment control BMPs are described as "Coarse Sediment and Trash" or as "Pollutants That Tend to Associate with Fine Particles During Treatment". The treatment control BMPs selected for the project, Settling Basins (Extended Detention Basins), High Rate Biofilters (Vegetated swales, and Infiltration Facilities (Rain Garden), provide removal efficiencies deemed to be "Medium" or "High" in accordance with County SUSMP requirements. Therefore it is determined that the treatment control BMPs, when used in conjunction with the project's proposed site design, source control, and LID BMPs, will adequately provide treatment of storm water runoff.

6.0 OPERATIONS AND MAINTENANCE

The operation and maintenance requirements for each type of BMP are contained in the following sections. The Salvation Army will be responsible for the maintenance and funding of all post-construction BMPs. No easements or agreements relating to long-term BMP maintenance are needed since the BMPs are private and are located on private property. The Retreat Center is currently staffed with employees that take care of the camp grounds. This staff will also be responsible for maintaining the various BMPs. The grounds superintendent will keep a log of maintenance activities and evaluation of BMP conditions.

The Salvation Army will also be responsible for funding the BMP maintenance. This funding will be included in its annual maintenance budget. The estimated maintenance costs are $8,000 to $10,000 per year. The majority of the costs will be time spent by the Salvation Army's maintenance staff to maintain and inspect BMPs. Any money left over in the budget should be put into a "contingency fund" and used in the event a large amount of maintenance work is required.

ORGANIZATION	Salvation Army Divisional Camp and Retreat
ADDRESS	14488 Mussey Grade Road
PHONE	760.788.3310

The following items are to be Conditions of Approval for the project. Satisfaction of these conditions is required prior to use and reliance.

(1) Submit a complete "Engineer's Report for BMP Maintenance".

(2) Dedicate all treatment control BMPs to the County of San Diego in accordance with the County Watershed Protection, Stormwater Management, and Discharge Control Ordinance.

(3) Form a "Stormwater Maintenance Zone" under the County Flood Control District, including taking all actions and submitting all required forms.

(4) Deposit $4,000, and pay all costs associated with reviewing the Engineer's Report and formation of the "Stormwater Maintenance Zone".

(5) Pay an amount equal to twenty-four (24) months of maintenance for the entire project as estimated in the approved Engineer's Report.

6.1 POST CONSTRUCTION BMPs

Post-construction BMPs are to be maintained in perpetuity. Maintenance requirements for site design, source control, and treatment control BMPs are shown below. It shall be noted that preventative maintenance such as removal of trash and debris from the site will help ensure proper function of the BMPs. Mimimum maintenance frequency is provided below for standard site design and source control BMPs. The engineer's report, which is to be completed as a condition of approval for the project, will include maintenance frequencies for all project specific site design, LID, source control, and treatment control BMPs.

SITE DESIGN BMP	RESPONSIBLE PARTY	MINIMUM MAINTENANCE FREQUENCY
MINIMIZE IMPERVIOUS FOOTPRINT	Salvation Army Divisional Camp and Retreat	Periodic inspection by staff to ensure pervious areas are not converted to impervious.
CONSERVE NATURAL AREAS	Salvation Army Divisional Camp and Retreat	Periodic inspection by staff to ensure natural areas are not encroached upon, free of debris.
MIMIMIZE DCIAS (DIRECTLY CONNECTED IMPERVIOUS AREAS)	Salvation Army Divisional Camp and Retreat	Periodic inspection by staff to ensure pervious areas are not converted to impervious.
LID BIOFILTER SWALES	Salvation Army Divisional Camp and Retreat	Periodic (monthly inspection to swales are not clogged or obstructed in any way. Inspection shall also monitor vegetation health.

SOURCE CONTROL BMP	RESPONSIBLE PARTY	MINIMUM MAINTENANCE FREQUENCY
PROVIDE STORM DRAIN STENCILING AND SIGNAGE	Salvation Army Divisional Camp and Retreat	Annual inspection to ensure the stencils are legible. If not, re-stencil.
DESIGN OUTDOOR MATERIAL STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION	Salvation Army Divisional Camp and Retreat	Monthly inspection to ensure storage are not exposed to storm water runoff which can lead to downstream pollution.
DESIGN TRASH STORAGE AREAS TO REDUCE POLLUTION INTRODUCTION	Salvation Army Divisional Camp and Retreat	Monthly inspection to ensure trash areas are not exposed to storm water runoff which can lead to downstream pollution.
USE EFFICIENT IRRIGATION SYSTEMS AND LANDSCAPING DESIGN	Salvation Army Divisional Camp and Retreat	Monthly inspection to ensure sprinklers are not broken, and equipment and landscaping is alive and operating properly.
INCORPORATE REQUIREMENTS APPLICABLE TO INDIVIDUAL PRIORITY PROJECT CATEGORIES	Salvation Army Divisional Camp and Retreat	Periodic inspection to ensure that road areas are clear of debris, and that erosion is not occurring onsite. If erosion is occurring, stability measure must be taken immediately based on CASQA SWPPP Erosion Control procedures.

TREATMENT CONTROL BMPS

Extended Detention Basins

The detention basins are Second Category BMPs. Inspections of detention basins will occur once to twice a month by the maintenance staff. Inspections will also occur after large storm events and on a weekly basis during periods of wet weather. An agreement will be entered into with the County, which will function two ways:

a) it will commit the land to being used only for the purposes of the BMP
b) it will include an agreement by the landowner, to maintain the facilities in accordance with the SWMP (this obligation will be passed on to future purchasers or successors of the landowner, as a covenant)

Trash and debris will be removed from detention basins on an as-needed basis. The outlet riser will be inspected and debris and sediment removed as often as necessary to ensure the riser functions properly. Any accumulated materials will be removed immediately from the basin when the detention volume is decreased by approximately 10% or the sediment is 18" deep. The materials will be removed by the maintenance staff. Removed materials are not considered hazardous waste and can be disposed of as landscaping material. If it is determined that hazardous waste has been deposited into the basin, the suspected waste will be analyzed to determine disposal options.

Vegetation in the basin should be kept to a maximum height of 18 inches. Vegetation should be trimmed and mowed as necessary, trees and woody vegetation shall be removed. The banks of the basin will be inspected for vegetative stabilization. Banks will be replanted as necessary. If erosion has been severe, other measure should be taken. Erosion control blankets or sodding should be used. Banks will also be inspected for structural integrity. Any repairs will be made within 10 working days.

Vegetated Swales and Rain Garden

Vegetated swales and the Rain Garden are First Category BMPs. Inspections of vegetated swales will also occur once a month by the maintenance staff. Inspections will also occur after large storm events and on a weekly basis during periods of wet weather. If standing water is observed, it will be removed to prevent any mosquito breeding or aquatic plant growth. Trash and debris and any other obstructions will be removed as necessary.
Landscaping maintenance will be necessary for the plants. The swales and rain garden will be planted with native vegetation rather than non-native grass seed, minimizing the extent of landscape maintenance. As this maintenance occurs, exposed soils will be raked to break up the surface and to mix any settled fines into the soil. If clogging is observed, it may be necessary to remove some of the accumulated soils. If erosion is occurring within swales or the rain garden, erosion blankets, riprap, or additional planting will be used to minimize the erosion.

ADDITIONAL PREVENTATIVE MAINTENANCE REQUIREMENTS
INSPECTION FREQUENCY Inspections of BMPs will occur at a minimum of once a month. Inspections will also occur before and after large storm events or on a weekly basis during periods of wet weather. The rainy season within the jurisdiction of the San Diego Regional Water Quality Control Board is October 1 – April 30. Refer to Figure 1 for extended detention basin locations.
PREVENTATIVE ACTIONS The following is a list of actions that will help prevent problems from occurring. They should be done on a routine basis throughout the duration of the project.

ADDITIONAL PREVENTATIVE MAINTENANCE REQUIREMENTS	
VEGETATION CONTROL	Vegetation in the detention/water quality basins should be trimmed and mowed to keep a maximum height of 18 inches. All vegetation clippings should be removed from the basin when trimming and mowing is conducted. Trimming and mowing prevents marsh vegetation from overtaking the basin and creating faunal habitats. It also prevents areas of water stagnation which can create a vector and health problem.
VECTOR CONTROL	Sediments deposited at the inlet structures should be managed to prevent areas of ponding and possible vector problems. Sediment grading can be accomplished by manually raking the deposits.
EQUIPMENT INSPECTION	All physical components of the BMPs should be regularly inspected for operability. This includes all valves, fence gates, locks, and access hatches.
GENERAL CLEANUP	Graffiti will be removed in a timely manner to improve the appearance of the BMPs. Weeds will be removed around fences and grass trimmed to keep the BMPs from becoming an eyesore and help discourage further graffiti or vandalism. All landscape clippings and cleaning solvents used to remove graffiti should be properly removed from the basin after cleanup.
MAINTENANCE INDICATORS AND CORRECTIVE ACTIONS The following is a list of indicators that would trigger immediate corrective actions to be taken. Corrective action should be taken within 10 days to ensure that damage does not occur from the detention/water quality basins and roadway median biofilter not operating efficiently.	
BLOCKAGE OF INLETS/OUTLETS	Any blockages from sediment, debris, or vegetation that keep the BMP from operating effectively will be removed immediately and properly disposed of. The basin should be able to completely drain within 72 hours after a storm.
STRUCTURAL DAMAGE	If any damage to the structural components of the BMP is found, repairs will be made promptly. Designers and contractors will conduct repairs where structural damage has occurred.
EMBANKMENT DAMAGE	Any damage to the embankments and slopes will be repaired quickly so that no erosion will occur.
EROSION DAMAGE	If there is damage due to erosion such as siltation, steps will be taken to prevent further loss of soil and repair any conditions that may cause the basin to not operate effectively. Possible corrective steps include erosion control blankets, riprap, sodding, or reduced flow through the area. Design engineers will be consulted to address erosion problems if the solution is not evident.
FENCE DAMAGE	Timely repair of fences will be done to maintain the security of the site and the safety of residents.
INVASIVE VEGETATION	If necessary, elimination of trees and woody vegetation will be required. Woody vegetation will be removed from embankments.
ANIMAL BURROWS	Animal burrows will be filled and compacted. Further steps may be needed to physically remove the animals if the problem persists. Vector control specialists will be consulted regarding possible solutions.
PROPOSED METHOD OF DISPOSING OF SEDIMENT AND POLLUTANTS	Removed sediment materials are not considered hazardous waste and can be disposed of as landscaping material. If it is determined that hazardous waste has been deposited into the BMP, the suspected waste will be analyzed to determine proper disposal options.

6.2 FISCAL RESOURCES

Following the completion of the project, the Salvation Army Divisional Camp and Retreat will be responsible for all areas within private property as follows: properly disposing of waste material from their assumed areas within the project site, maintaining conditions throughout the site in a manner that will prevent soil erosion and minimize sediment transport, the site in a clean manner, and ensuring that treatment BMPs are functional.

It should be noted that maintenance for any of the above mentioned BMPs may be performed through third-party agreements; however, the ultimate responsibility of each facility rests on the Salvation Army Divisional Camp and Retreat as noted above.

Based on Appendix H of the County of San Diego's SUSMP, each extended detention basin costs approximately $1,200 per year to maintain, and a bio-filter costs approximately $1,670 per year to maintain. A private maintenance company can be hired to maintain them or the maintenance can be carried out by Salvation Army maintenance staff.

ESTIMATED SUMMARY OF BMP O+M COSTS		
BMP NAME	FREQUENCY	ESTIMATED COST
Site Design/LID BMPs	Monthly- or as stated	$1,670 per Biofilter per year
Source Control BMPs	Monthly- or as stated	Included with standard Site Landscaping and Maintenance
Treatment Control Detention Basins	Monthly- or as stated	$1,200 per Extended Detention Basin per year $1,670 per Rain Garden

The Extended Detention Basins BMPs are to fall under the Second Category BMP Maintenance Plan per the County of San Diego SUSMP. Primary maintenance is the responsibility of the landowners, the Salvation Army Divisional Camp and Retreat. At the time of final engineering, a maintenance agreement will be entered into with the County which will: 1) commit the land to be used for BMP maintenance only; 2) require the Salvation Army Divisional Camp and Retreat to maintain the facilities in accordance with the SMP; and 3) create an easement to the County granting them the right to enter onto the land to maintain BMPs, if needed.

The Salvation Army Divisional Camp and Retreat must provide the County with security (equal to the amount of the estimated cost of two years of maintenance) that will remain in place for a period of five years. The security may be a cash deposit, letter of credit or other form acceptable to the County. The fee for two years of maintenance on seven extended detention basins will equal $16,800. ($1,200/yr x 7 basins x 2 years), and the fee for maintenance on two treatment control bioswales and one Rain Graden is $10,020 ($1670/yr x 3 facilities x 2 years), for a total fee of $26,820. Additionally, the Salvation Army Divisional Camp and Retreat will pay a $4,000 deposit to cover the costs of reviewing the Engineer's Report and forming a "Storm Water Management Zone".

7.0 SUMMARY AND CONCLUSIONS

Post project site conditions reflect increases in impervious surfaces; however peak discharge will not be increased by the proposed project due to the inclusion of detention basins in the project design. The use of source control, LID, treatment control, and site design BMPs in practice through the day to day function of the project will result in a decreased potential for storm water pollution.

Maintenance will be the responsibility of the Salvation Army Divisional Camp and Retreat, which will maintain the Site Design, LID, Source Control, and Treatment Control BMPs throughout the lifetime of the project.

ANNUAL CERTIFICATION OF BMP MAINTENANCE

The Salvation Army Divisional Camp and Retreat shall verify BMP implementation and ongoing maintenance through inspection, self-certification, survey, or other equally effective measure. The certification shall verify that, at a minimum, the inspection and maintenance of all structural BMPs including inspection and performance of any required maintenance prior to the start of the both the August 1- October 1 and November 1- May 1 rainy seasons. The enforcement and verification of this task is conducted by the County of San Diego Storm Water NPDES Program.

The County will only verify that the appropriate documentation of maintenance exists. It is the Salvation Army Divisional Camp and Retreat's sole responsibility to conduct maintenance and provide documentation, upon request. At the time of final engineering, a BMP Maintenance Agreement will be recorded.

LONG-TERM FUNDING FOR BMP MAINTENANCE

Long-term funding for BMP maintenance shall be funded by the Salvation Army Divisional Camp and Retreat.

ACCESS EASEMENT FOR INSPECTION

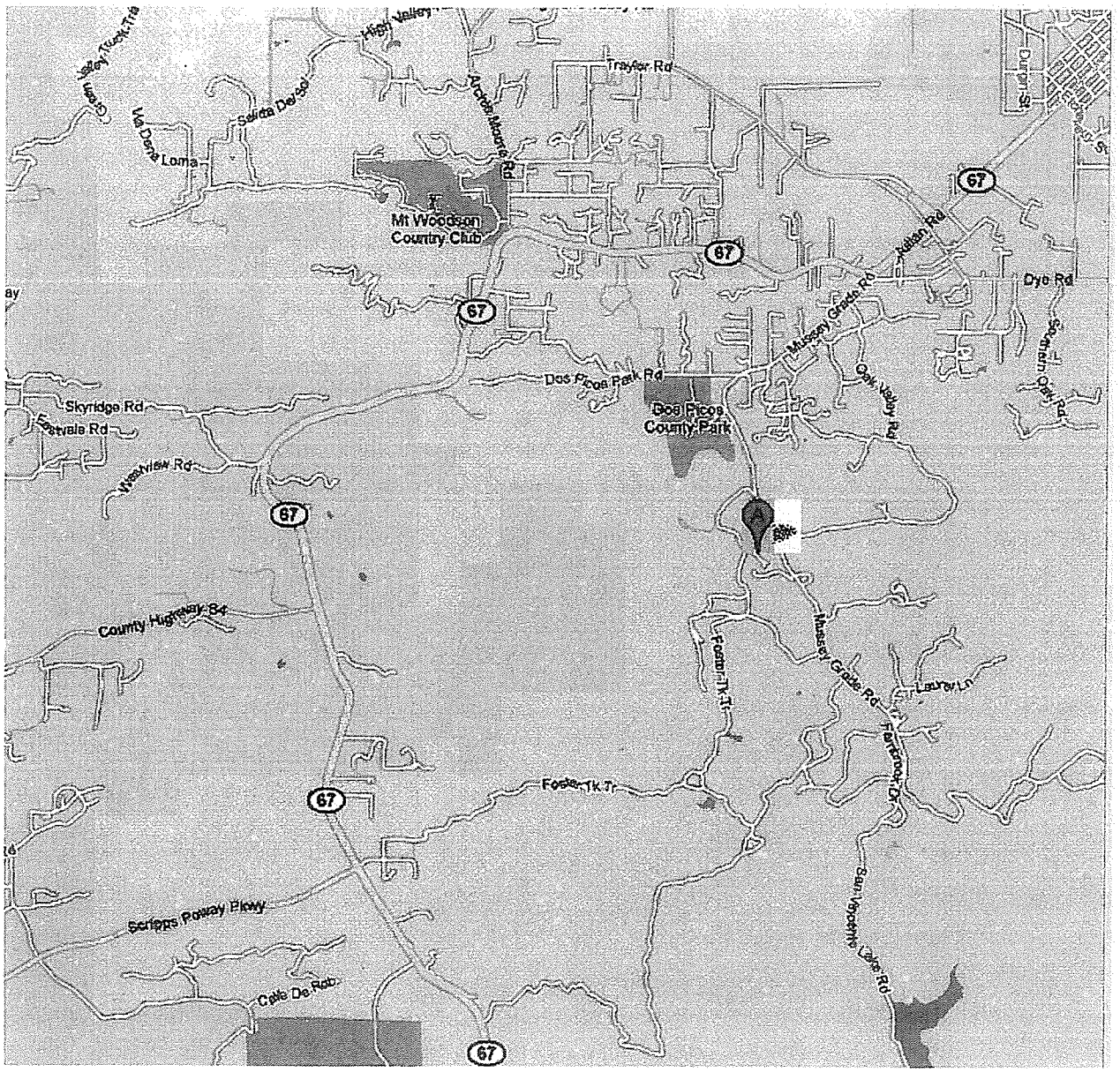
The Salvation Army Divisional Camp and Retreat entity assumes responsibility for operation and maintenance of BMPs, however if needed the County of San Diego shall be granted able access for inspection through a formal agreement.

The expansion of the existing Salvation Army Divisional Camp and Retreat Center has potential environmental impacts due to the increased use and traffic. It has the potential to release oil and grease, various chemicals, and debris into the site runoff. However, BMPs have been designed to mitigate these potential pollutants. Perhaps the greatest BMP is leaving the site largely undisturbed and very rustic. The natural surroundings provide a large amount of pervious surface for filtration and water quality treatment. In addition, vegetated swales have been included in the site design to provide a natural source of water quality pre-treatment and treatment (in the southerly portion of Area 5). The maintenance facilities area has been designed with a storage area that is covered, greatly limiting any potential contact with storm water and non-storm water runoff. Training will be provided to employees to ensure proper handling of wastes and debris. Detention basins will be utilized to decrease the volume and velocity of the discharge and to provide a medium to high level of treatment control. With these BMPs in place, the Camp/Retreat Center expansion meets and exceeds water quality standards by managing any possible adverse environmental impacts.

8.0 APPENDICES

Attachment A	*Location Map*
Attachment B	*Grading Plans / Site Map*
Attachment C	*Relevant Monitoring Data*
Attachment D	*SWMP Exhibits and LID/Treatment BMP Location Map*
Attachment E	*Treatment BMP Data Sheets*
Attachment F	*O+M Program*
Attachment G	*Fiscal Resources*
Attachment H	*Engineers Certification Sheet*
Attachment I	*Addendum*

ATTACHMENT A
LOCATION MAP
NOT TO SCALE



Attachment B: Site Map

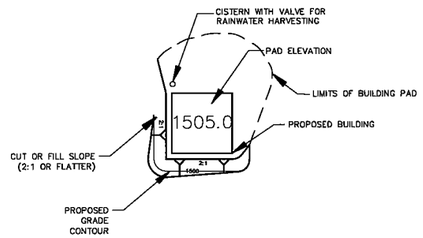
Reduced Sized Grading Plans for the Project

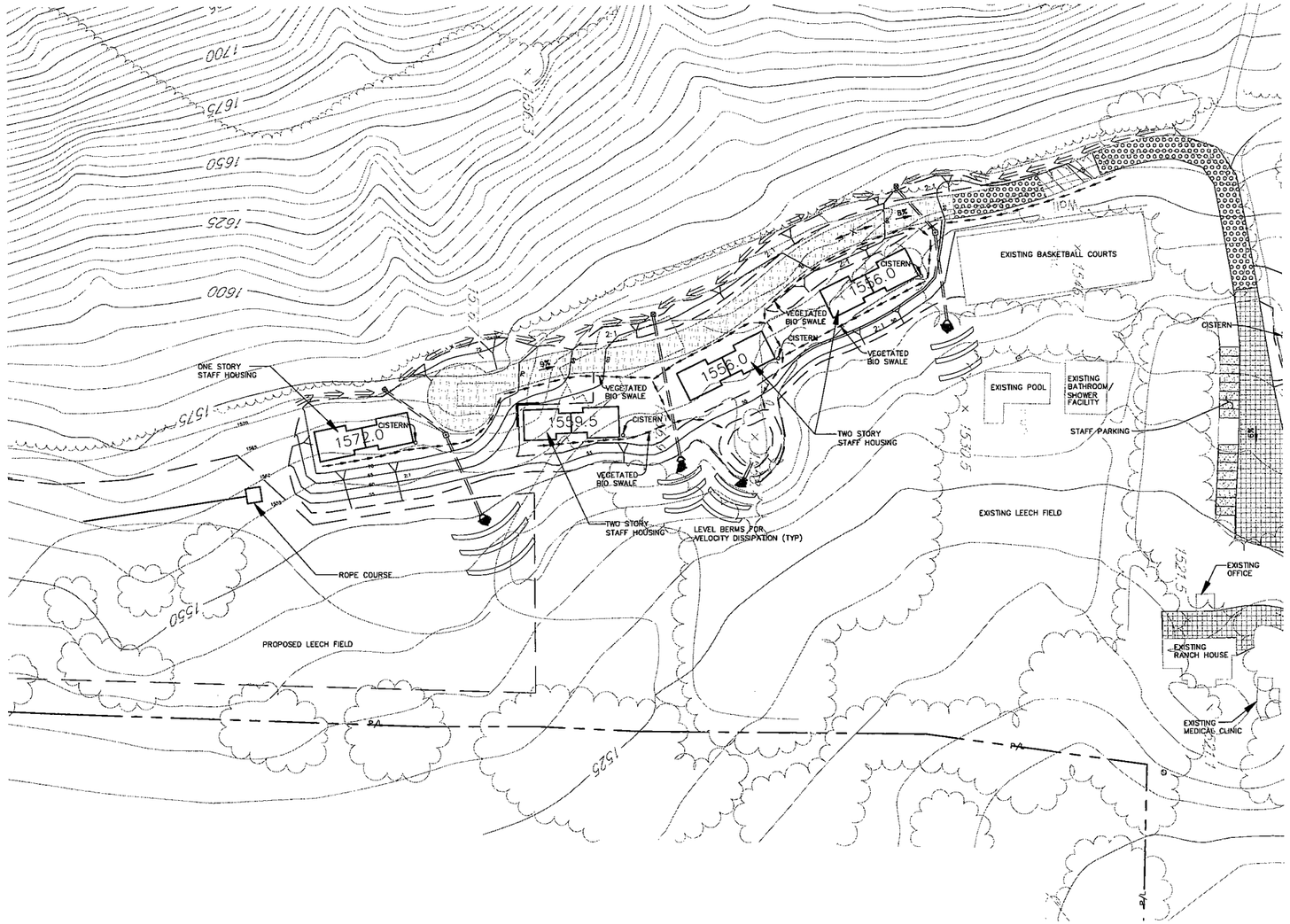
LEGEND:

- PROPOSED STORM DRAIN INLET (SIDE OPENING)
- PROPOSED CURB INLET.
- PROPOSED STORM DRAIN CLEAN OUT
- PROPOSED STORM DRAIN
- PROPOSED EARTHEN DRAINAGE SWALE
- PROPOSED HEADWALL
- PROPOSED RIP RAP
- TOP/TOE OF SLOPE (LIMIT OF GRADING)
- PROPOSED RETAINING WALL
- PAVE EXISTING DIRT ROAD
- NEW 24' WIDE ROAD (A.C. PAVED).
- PAVE EXISTING DIRT ROAD (19' WIDE DUE TO ENVIRONMENTAL CONSTRAINTS)
- PROPOSED NATIVE GRANULAR MATERIAL (PARKING AREAS).
- EXISTING PAVED ROAD TO REMAIN
- EXISTING DIRT ROAD TO REMAIN UNPAVED.
- 100 YEAR STORM AREA OF INUNDATION.

BMP LEGEND:

- PROPOSED VEGETATED BIO SWALE
- PROPOSED CISTERN WITH VALVE
- PROPOSED DETENTION BASIN





EARTHWORK QUANTITIES

AREA	CUT (CY)	FILL (CY)	IMPORT (EXPORT) (CY)
1	7,000	12,000	5,000
2	6,000	15,000	9,000
3	38,000	42,000	4,000
4	7,000	12,000	5,000
5	17,000	20,000	3,000
6	55,000	21,000	−34,000
SHRINKAGE ALLOWANCE		7,800	
TOTAL	130,000	129,800	−200

* SEE SHEET 32R1 FOR EARTHWORK QUANTITIES FOR REDUCED ALTERNATIVE 1 OR 32R2 FOR EARTHWORK QUANTITIES FOR REDUCED ALTERNATIVE 2.

DISTURBED AREA:
984,459 SF = 22.6 ACRES

NOTES:

1. PRELIMINARY GRADING PLAN NOTE:

"THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY."

2. PROPOSED RUNOFF TREATMENT CONTROL BMP'S ARE SHOWN ON THIS PLAN AND DESCRIBED IN DETAIL OF THE STORM WATER MANAGEMENT PLAN.

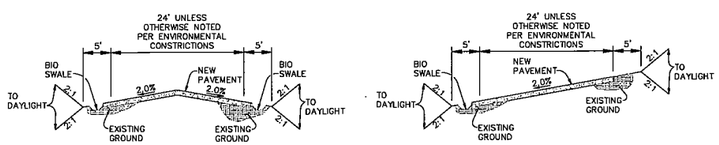
3. ELEVATIONS AND CONTOURS ARE BASED UPON A SURVEY BY STUART ENGINEERING DATED 3-13-1997.

4. BENCH MARK:

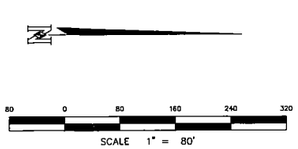
RECORD OF SURVEY 9942
CONTROL POINT 52-26-2
EL 1503.64 MSL

5. ALL WALKWAYS AND PARKING TO BE CONSTRUCTED OF NATIVE GRANULAR MATERIAL.

ENLARGED AREA #1 PLAN PROPOSED FOR DEVELOPMENT 2.1 ACRES
GRADING PLAN



TYPICAL SECTIONS
NO SCALE



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4740 Ruffner Street, San Diego, California, 92111 •858-292-7770

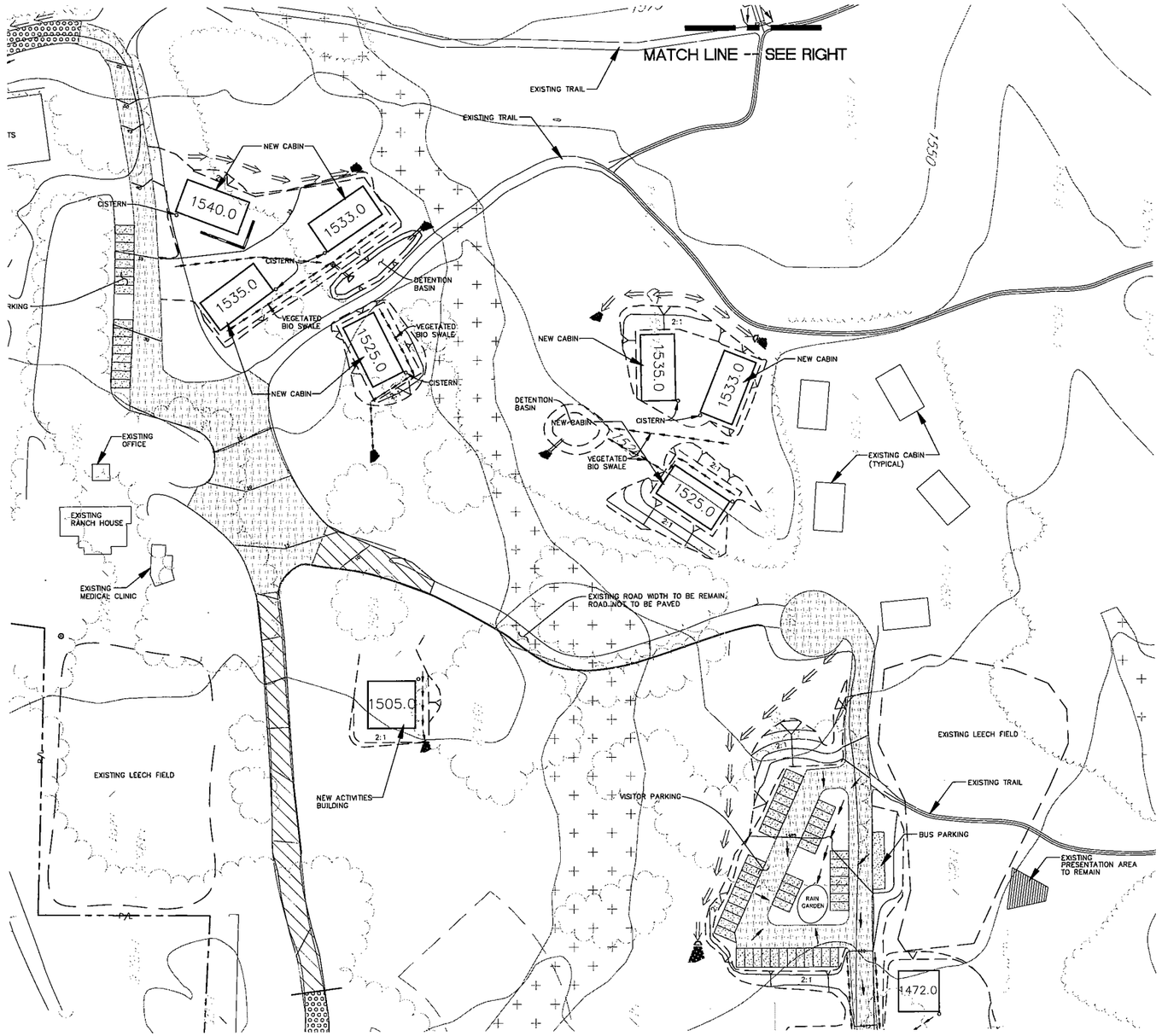
MATALON
ARCHITECTURE + PLANNING
7596 EADS AVENUE, SUITE 120
SAN DIEGO, CALIFORNIA 92037
(858) 551-937FAX (858) 551-9267

PROPOSED MASTER PLAN FOR
THE SALVATION ARMY
DIVISIONAL CAMP AND RETREAT CENTER
RAMONA, CALIFORNIA

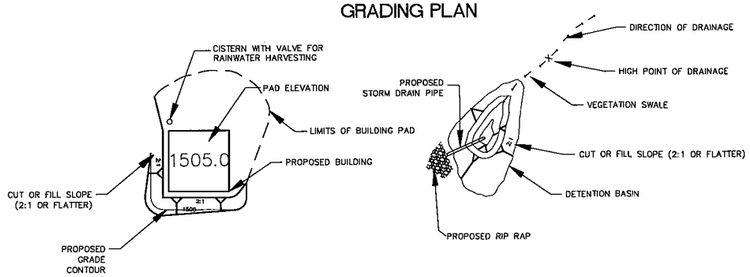
REVISIONS

DATE: 11.10.09
SCALE: NOTED
DRAWN BY: LT, PP, JS
PROJECT NO.: 97021.01

SHEET: 7



ENLARGED AREA #2 PLAN
GRADING PLAN



LEGEND:

- PROPOSED STORM DRAIN INLET (SIDE OPENING)
- PROPOSED CURB INLET.
- PROPOSED STORM DRAIN CLEAN OUT
- PROPOSED STORM DRAIN
- PROPOSED EARTHEN DRAINAGE SWALE
- PROPOSED HEADWALL
- PROPOSED RIP RAP
- TOP/TOE OF SLOPE (LIMIT OF GRADING)
- PROPOSED RETAINING WALL
- PAVE EXISTING DIRT ROAD
- NEW 24' WIDE ROAD (A.C. PAVED).
- PAVE EXISTING DIRT ROAD (19' WIDE DUE TO ENVIRONMENTAL CONSTRAINTS)

BMP LEGEND:

- PROPOSED VEGETATED BIO SWALE
- PROPOSED CISTERN WITH VALVE
- PROPOSED DETENTION BASIN

NOTES:

1. PRELIMINARY GRADING PLAN NOTE:

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4. SEE SHEET 7 FOR GRADING QUANTITIES.

5. BENCH MARK:

RECORD OF SURVEY 9942
CONTROL POINT 52-26-2
EL 1503.64 MSL

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7596 EADS AVENUE, SUITE 120
SAN DIEGO, CALIFORNIA 92037
(858) 551-9377FAX (858) 551-9267

PROPOSED MASTER PLAN FOR
THE SALVATION ARMY
DIVISIONAL CAMP AND RETREAT CENTER
RAMONA, CALIFORNIA

REVISIONS	2.10.03
DATE:	6.21.01
SCALE:	NOTED
DRAWN BY:	PP, SW, JG, DB
PROJECT NO.:	97021.01
SHEET:	

LEGEND:

- PROPOSED STORM DRAIN INLET (SIDE OPENING)
- PROPOSED CURB INLET
- PROPOSED STORM DRAIN CLEAN OUT
- PROPOSED STORM DRAIN
- PROPOSED EARTHEN DRAINAGE SWALE
- PROPOSED HEADWALL
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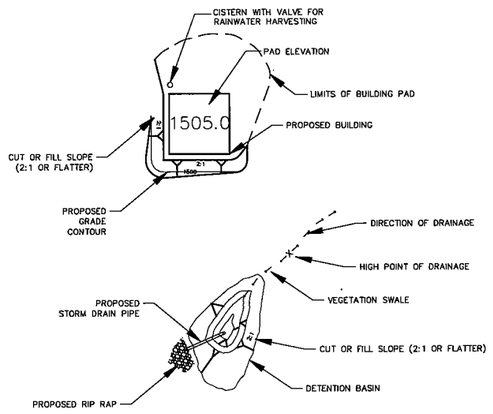
BMP LEGEND:

- PROPOSED VEGETATED BIO SWALE
- PROPOSED CISTERN WITH VALVE
- PROPOSED DETENTION BASIN



NOTES:

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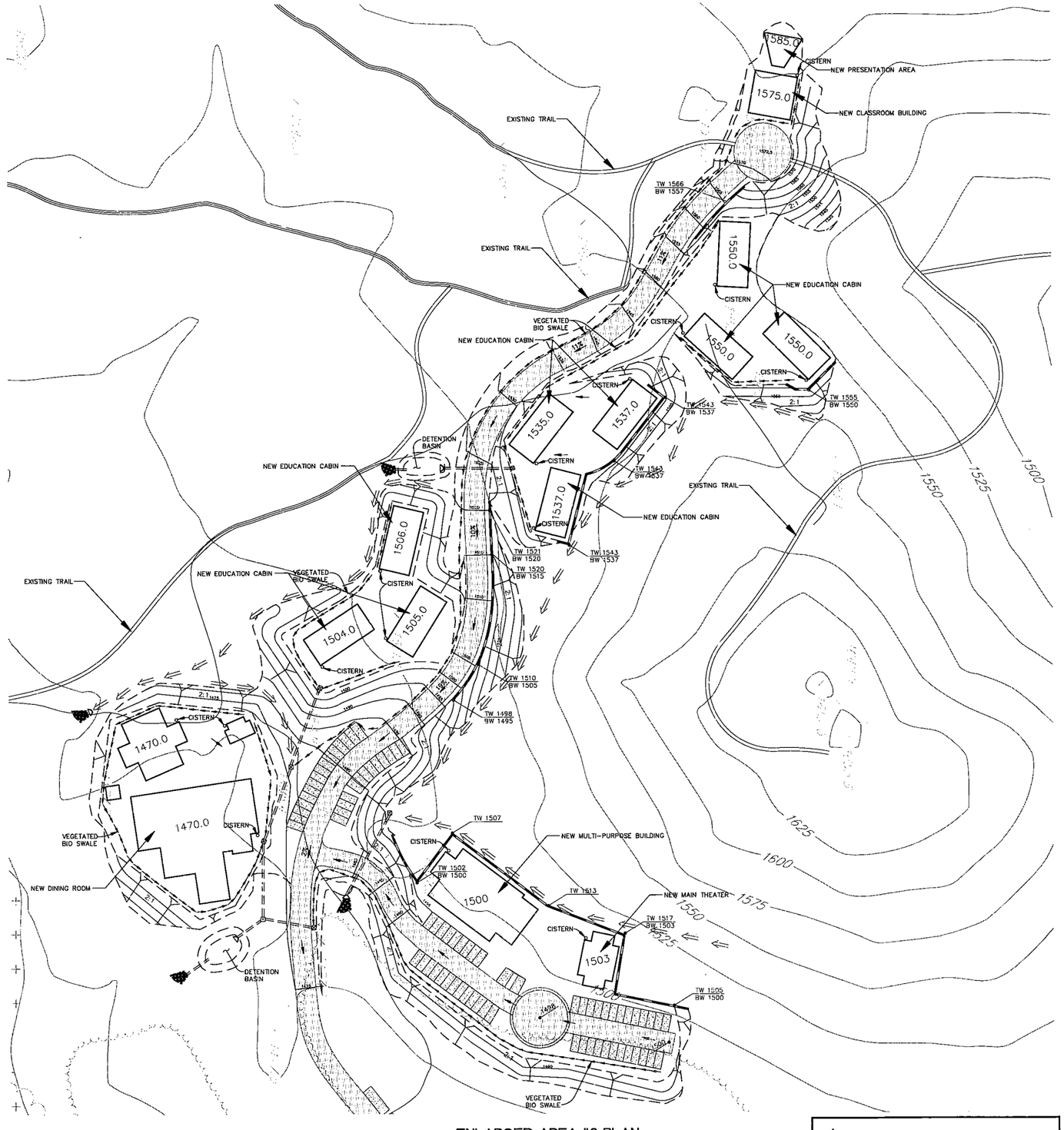
CONTROL POINT 52-26-2
EL 1503.64 MSL



ENLARGED AREA #3 PLAN
GRADING PLAN

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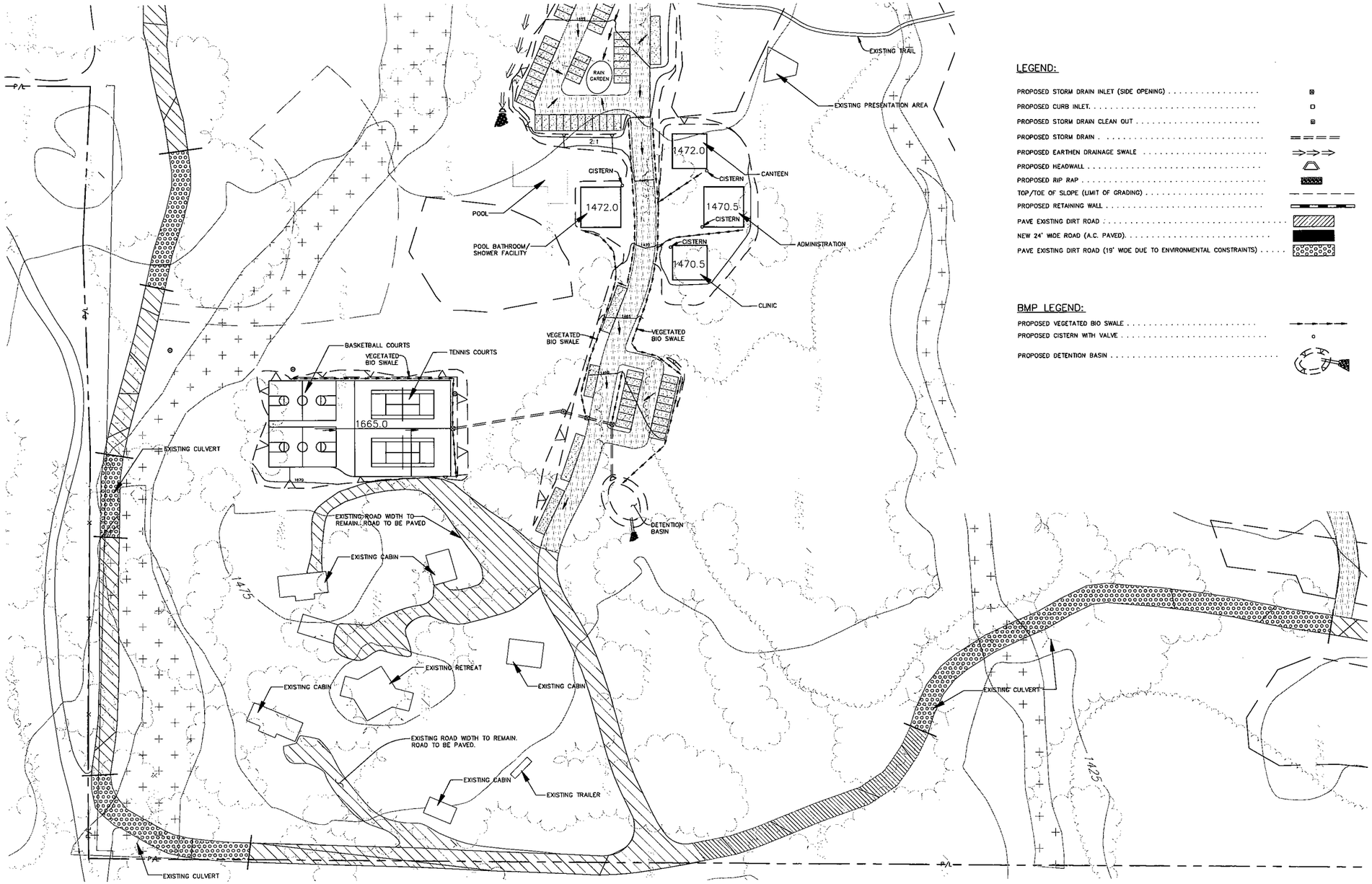
PROPOSED MASTER PLAN FOR
THE SALVATION ARMY
DIVISIONAL CAMP AND RETREAT CENTER
RAMONA, CALIFORNIA

REVISIONS	2.10.03
DATE:	6.21.01
SCALE:	NOTED
DRAWN BY:	PP, SW, JG, DB
PROJECT NO.:	97021.01
SHEET:	



LEGEND:

- PROPOSED STORM DRAIN INLET (SIDE OPENING)
- PROPOSED CURB INLET.
- PROPOSED STORM DRAIN CLEAN OUT
- PROPOSED STORM DRAIN
- PROPOSED EARTHEN DRAINAGE SWALE
- PROPOSED HEADWALL
- PROPOSED RIP RAP
- TOP/TOE OF SLOPE (LIMIT OF GRADING)
- PROPOSED RETAINING WALL
- PAVE EXISTING DIRT ROAD
- NEW 24' WIDE ROAD (A.C. PAVED).
- PAVE EXISTING DIRT ROAD (19' WIDE DUE TO ENVIRONMENTAL CONSTRAINTS)

BMP LEGEND:

- PROPOSED VEGETATED BIO SWALE
- PROPOSED CISTERN WITH VALVE
- PROPOSED DETENTION BASIN

NOTES:

1. PRELIMINARY GRADING PLAN NOTE:

"THIS PLAN IS PROVIDED TO ALLOW FOR FULL AND ADEQUATE DISCRETIONARY REVIEW OF A PROPOSED DEVELOPMENT PROJECT. THE PROPERTY OWNER ACKNOWLEDGES THAT ACCEPTANCE OR APPROVAL OF THIS PLAN DOES NOT CONSTITUTE AN APPROVAL TO PERFORM ANY GRADING SHOWN HEREON, AND AGREES TO OBTAIN A VALID GRADING PERMIT BEFORE COMMENCING SUCH ACTIVITY."

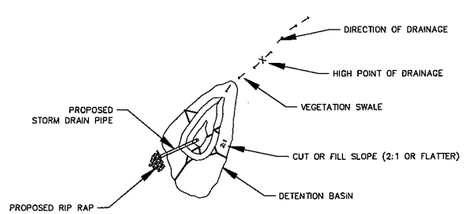
2. PROPOSED RUNOFF TREATMENT CONTROL BMP'S ARE SHOWN ON THIS PLAN AND DESCRIBED IN DETAIL OF THE STORM WATER MANAGEMENT PLAN.

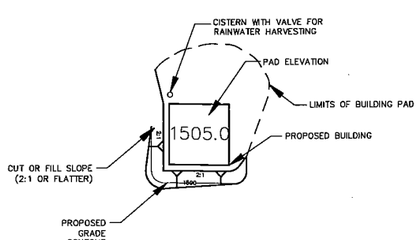
3. ELEVATIONS AND CONTOURS ARE BASED UPON A SURVEY BY STUART ENGINEERING DATED 3-13-1997.

4. SEE SHEET 7 FOR GRADING QUANTITIES.

5. BENCH MARK:

RECORD OF SURVEY 9942
CONTROL POINT 52-26-2
EL 1503.64 MSL





ENLARGED AREA #4 PLAN
GRADING PLAN

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REVISIONS	2.10.03
DATE:	6.21.01
SCALE:	NOTED
DRAWN BY:	PP, SW, JC, DB
PROJECT NO.:	97021.01
SHEET:	

NOTES:

1. PRELIMINARY GRADING PLAN NOTE:

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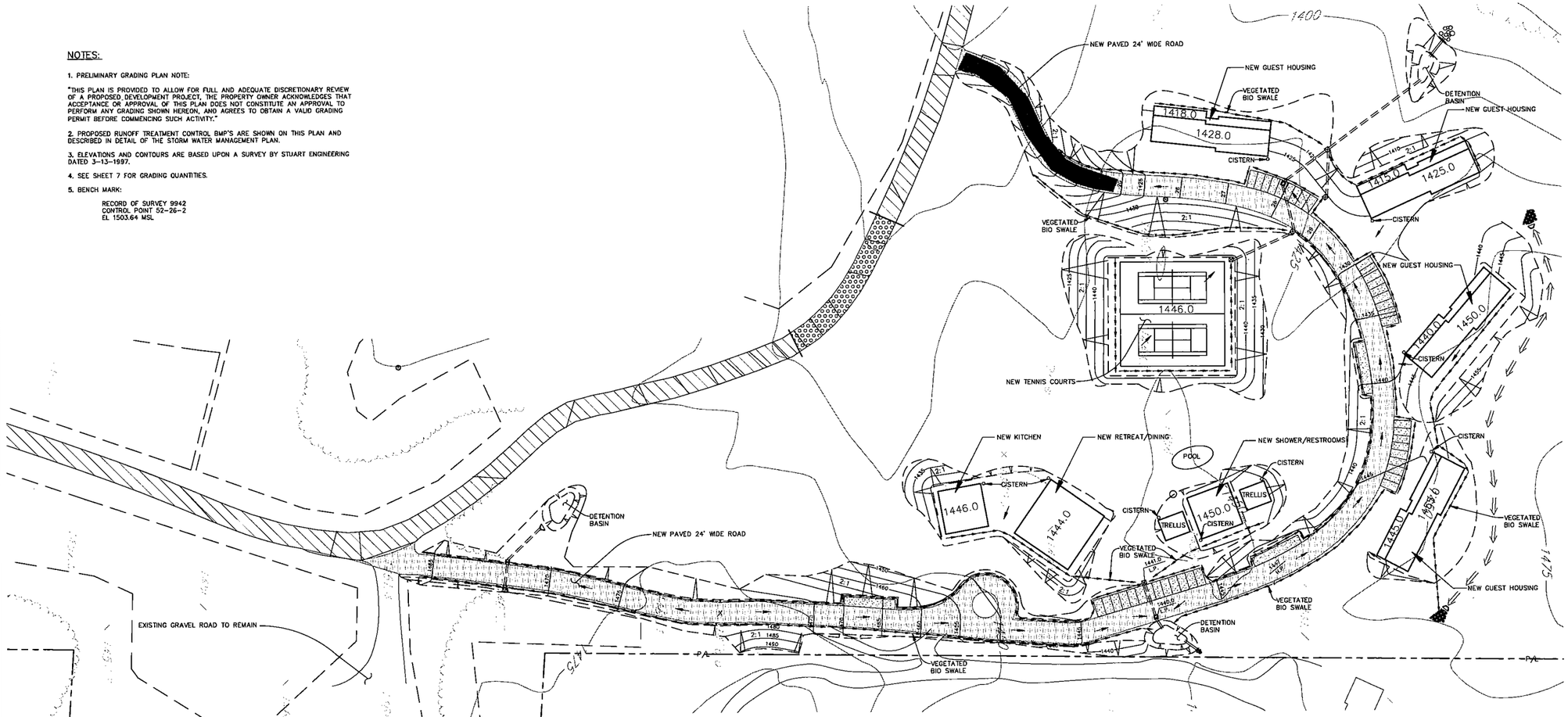
2. PROPOSED RUNOFF TREATMENT CONTROL BMP'S ARE SHOWN ON THIS PLAN AND DESCRIBED IN DETAIL OF THE STORM WATER MANAGEMENT PLAN.

3. ELEVATIONS AND CONTOURS ARE BASED UPON A SURVEY BY STUART ENGINEERING DATED 3-13-1997.

4. SEE SHEET 7 FOR GRADING QUANTITIES.

5. BENCH MARK:

RECORD OF SURVEY 9942
CONTROL POINT 52-26-2
EL 1503.64 MSL



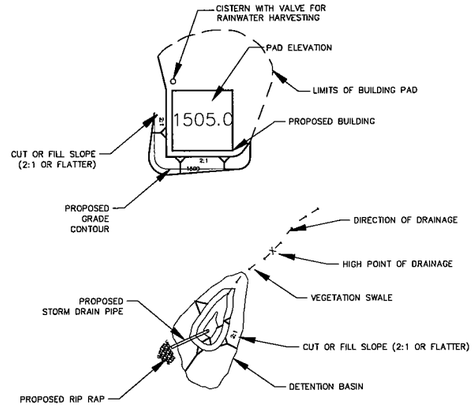
ENLARGED AREA #5 AND #6A - REDUCED ALTERNATIVE #1 GRADING PLAN

LEGEND:

- PROPOSED STORM DRAIN INLET (SIDE OPENING)
- PROPOSED CURB INLET.
- PROPOSED STORM DRAIN CLEAN OUT
- PROPOSED STORM DRAIN
- PROPOSED EARTHEN DRAINAGE SWALE
- PROPOSED HEADWALL
- PROPOSED RIP RAP
- TOP/TOE OF SLOPE (LIMIT OF GRADING)
- PROPOSED RETAINING WALL
- PAVE EXISTING DIRT ROAD
- NEW 24' WIDE ROAD (A.C. PAVED).
- PAVE EXISTING DIRT ROAD (19' WIDE DUE TO ENVIRONMENTAL CONSTRAINTS)

BMP LEGEND:

- PROPOSED VEGETATED BIO SWALE
- PROPOSED CISTERN WITH VALVE
- PROPOSED DETENTION BASIN



EARTHWORK QUANTITIES
IF REDUCED ALTERNATIVE IS IMPLEMENTED

AREA	CUT (CY)	FILL (CY)	IMPORT (EXPORT) (CY)
1	9,000	9,000	0
2	8,000	10,000	2,000
3	40,000	37,000	-3,000
4	9,000	9,000	0
5	18,000	17,000	-1,000
6	20,000	16,000	-4,000
SHRINKAGE ALLOWANCE		6,240	
TOTAL	104,000	104,240	240

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Attachment C: Relevant Monitoring Data

Relevant soils information from the USDA Soils Survey is included in this attachment.

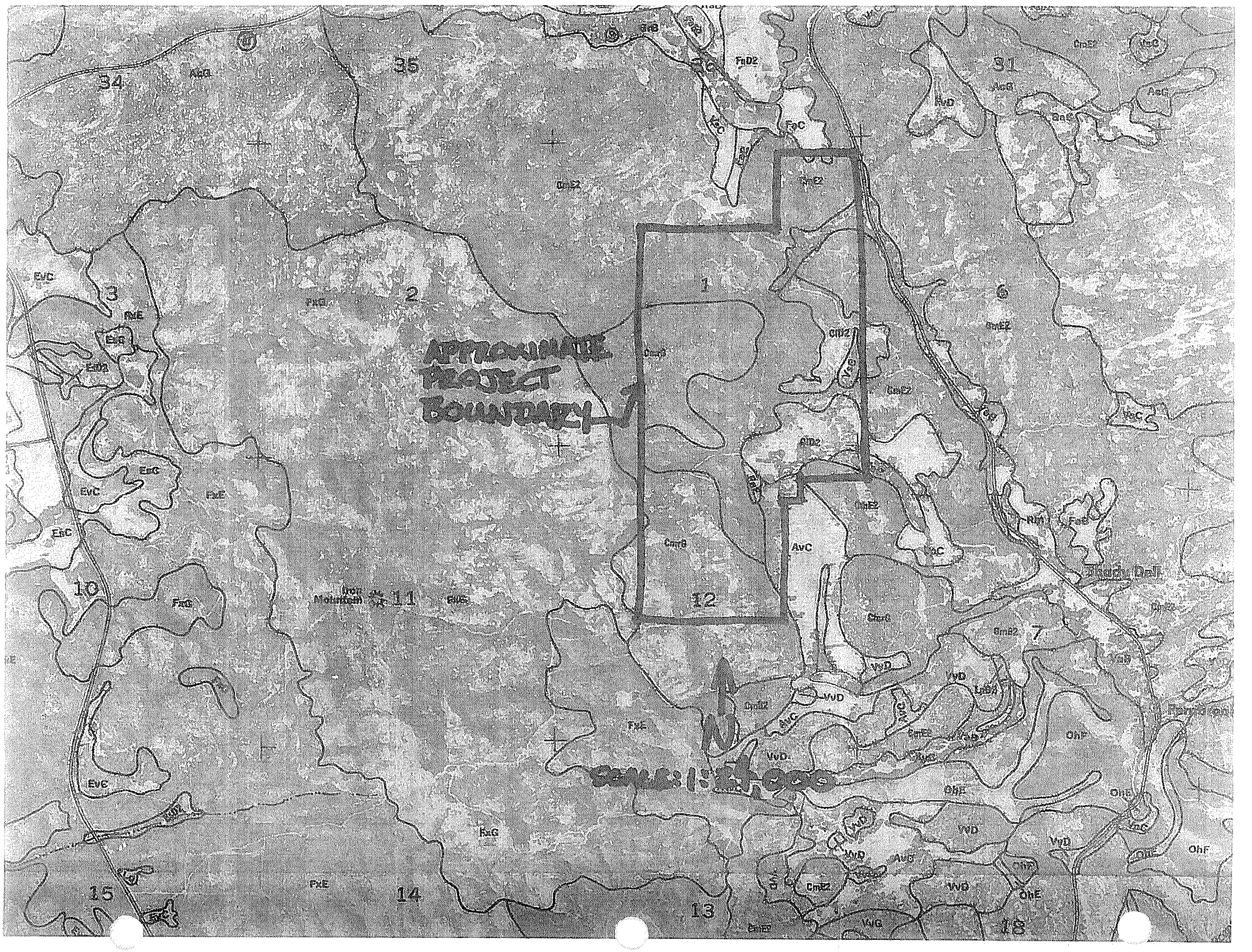
APPROXIMATE PROJECT BOUNDARY
N
SCALE: 1:24,000
34
35
31
3
2
1
6
10
11
12
7
15
14
13
18
Iron Mountain
Sandy Dell
FxE
FxG
EvC
EsC
AvC
VvD
OhF
OhE
CmE2
VaC
FaD2
FaC
AuG

TABLE 11.--INTERPRETATIONS FOR LAND MANAGEMENT

[Numerals indicate soil properties or qualities that affect erodibility. Numeral 1 refers to slope; 2 to surface layer texture; 9 to depth to hard rock, or a hardpan, or any layer that restricts permeability; 16 to grade of structure in the surface layer. Absence of rating means no valid interpretations can be made]

Map symbol	Soil	Hydrologic group	Erodibility	Limitations for conversion from brush to grass
AcG	Acid igneous rock land	D	Severe 1-----	Severe.
AtC	Altamont clay, 5 to 9 percent slopes	D	Slight-------	Slight. 1/
AtD	Altamont clay, 9 to 15 percent slopes	D	Slight-------	Slight. 1/
AtD2	Altamont clay, 9 to 15 percent slopes, eroded	D	Slight-------	Slight. 1/
AtE	Altamont clay, 15 to 30 percent slopes	D	Moderate 1---	Slight. 1/
AtE2	Altamont clay, 15 to 30 percent slopes, eroded	D	Moderate 1---	Slight. 1/
AtF	Altamont clay, 30 to 50 percent slopes	D	Severe 1-----	Moderate. 1/
AuC	Anderson very gravelly sandy loam, 5 to 9 percent slopes.	A	Severe 16----	Slight.
AuF	Anderson very gravelly sandy loam, 9 to 45 percent slopes.	A	Severe 16----	Moderate. 2/
AvC	Arlington coarse sandy loam, 2 to 9 percent slopes	C	Severe 16----	Slight.
AwC	Auld clay, 5 to 9 percent slopes	D	Slight-------	Slight.
AwD	Auld clay, 9 to 15 percent slopes	D	Slight-------	Slight.
AyE	Auld stony clay, 9 to 30 percent slopes	D	Moderate 1---	Slight.
BaG	Badland	D	Severe 1-----	Severe.
BbE	Bancas stony loam, 5 to 30 percent slopes	C	Severe 16----	Moderate.
BbE2	Bancas stony loam, 5 to 30 percent slopes, eroded	C	Severe 16----	Moderate.
BbG	Bancas stony loam, 30 to 65 percent slopes	C	Severe 1-----	Moderate.
BbG2	Bancas stony loam, 30 to 65 percent slopes, eroded	C	Severe 1-----	Moderate.
BeE	Blasingame loam, 9 to 30 percent slopes	D	Severe 16----	Slight.
BgE	Blasingame stony loam, 9 to 30 percent slopes	D	Severe 16----	Moderate.
BgF	Blasingame stony loam, 30 to 50 percent slopes	D	Severe 1-----	Moderate.
BlC	Bonsall sandy loam, 2 to 9 percent slopes	D	Severe 9-----	Slight.
BlC2	Bonsall sandy loam, 2 to 9 percent slopes, eroded	D	Severe 9-----	Slight.
BlD2	Bonsall sandy loam, 9 to 15 percent slopes, eroded	D	Severe 9-----	Slight.
BmC	Bonsall sandy loam, thick surface, 2 to 9 percent slopes.	D	Moderate 2---	Slight.
BnB	Bonsall-Fallbrook sandy loams, 2 to 5 percent slopes:			
	Bonsall	D	Severe 9-----	Slight.
	Fallbrook	C	Severe 9-----	Slight.
BoC	Boomer loam, 2 to 9 percent slopes	C	Moderate 2---	Slight.
BoE	Boomer loam, 9 to 30 percent slopes	C	Moderate 1---	Slight.
BrE	Boomer stony loam, 9 to 30 percent slopes	C	Moderate 1---	Slight.
BrG	Boomer stony loam, 30 to 65 percent slopes	C	Severe 1-----	Moderate.
BsC	Bosanko clay, 2 to 9 percent slopes	D	Moderate 16--	Slight. 1/
BsD	Bosanko clay, 9 to 15 percent slopes	D	Moderate 16--	Slight. 1/
BsE	Bosanko clay, 15 to 30 percent slopes	D	Moderate 1---	Slight. 1/
BtC	Bosanko stony clay, 5 to 9 percent slopes	D	Moderate 16--	Slight. 3/
BuB	Bull Trail sandy loam, 2 to 5 percent slopes	C	Severe 16----	Slight. 4/
BuC	Bull Trail sandy loam, 5 to 9 percent slopes	C	Severe 16----	Slight. 4/
BuD2	Bull Trail sandy loam, 9 to 15 percent slopes, eroded	C	Severe 16----	Slight. 4/
BuE2	Bull Trail sandy loam, 15 to 30 percent slopes, eroded	C	Severe 16----	Slight. 4/
CaB	Calpine coarse sandy loam, 2 to 5 percent slopes	B	Moderate 2---	Slight. 4/
CaC	Calpine coarse sandy loam, 5 to 9 percent slopes	B	Moderate 2---	Slight. 4/
CaC2	Calpine coarse sandy loam, 5 to 9 percent slopes, eroded.	B	Moderate 2---	Slight. 4/

See footnotes at end of table.

TABLE 11.--INTERPRETATIONS FOR LAND MANAGEMENT--Continued

Map symbol	Soil	Hydrologic group	Erodibility	Limitations for conversion from brush to grass
CaD2	Calpine coarse sandy loam, 9 to 15 percent slopes, eroded.	B	Moderate 2---	Slight. 4/
CbB	Carlsbad gravelly loamy sand, 2 to 5 percent slopes------	C	Severe 2-----	Slight.
CbC	Carlsbad gravelly loamy sand, 5 to 9 percent slopes------	C	Severe 2-----	Slight.
CbD	Carlsbad gravelly loamy sand, 9 to 15 percent slopes-----	C	Severe 2-----	Slight.
CbE	Carlsbad gravelly loamy sand, 15 to 30 percent slopes----	C	Severe 2-----	Slight.
CcC	Carlsbad-Urban land complex, 2 to 9 percent slopes-------	D		
CcE	Carlsbad-Urban land complex, 9 to 30 percent slopes------	D		
CeC	Carrizo very gravelly sand, 0 to 9 percent slopes--------	A	Severe 2	
CfB	Chesterton fine sandy loam, 2 to 5 percent slopes--------	D	Severe 9-----	Slight.
CfC	Chesterton fine sandy loam, 5 to 9 percent slopes--------	D	Severe 9-----	Slight.
CfD2	Chesterton fine sandy loam, 9 to 15 percent slopes, eroded.	D	Severe 9-----	Moderate.
CgC	Chesterton-Urban land complex, 2 to 9 percent slopes:			
	Chesterton----------	D		
	Urban land----------	D		
ChA	Chino fine sandy loam, 0 to 2 percent slopes----------	C	Severe 16----	Slight.
ChB	Chino fine sandy loam, 2 to 5 percent slopes----------	C	Severe 16----	Slight.
CkA	Chino silt loam, saline, 0 to 2 percent slopes----------	C	Moderate 2---	Moderate.
ClD2	Cieneba coarse sandy loam, 5 to 15 percent slopes, eroded.	B	Severe 16----	Severe.
ClE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, eroded.	B	Severe 16----	Severe.
ClG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded.	B	Severe 1-----	Severe.
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded.	B	Severe 16----	Severe.
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes.	B	Severe 1-----	Severe.
CnE2	Cieneba-Fallbrook rocky sandy loams, 9 to 30 percent slopes, eroded:			
	Cieneba----------	B	Severe 16----	Severe.
	Fallbrook----------	C	Severe 16----	Severe.
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded:			
	Cieneba----------	B	Severe 1-----	Severe.
	Fallbrook----------	C	Severe 1-----	Severe.
Co	Clayey alluvial land----------	D	Moderate 2---	Slight.
Cr	Coastal beaches----------	A	Severe 2	
CsB	Corralitos loamy sand, 0 to 5 percent slopes----------	A	Severe 2-----	Slight.
CsC	Corralitos loamy sand, 5 to 9 percent slopes----------	A	Severe 2-----	Slight.
CsD	Corralitos loamy sand, 9 to 15 percent slopes----------	A	Severe 2-----	Slight.
CtE	Crouch coarse sandy loam, 5 to 30 percent slopes---------	B	Severe 16----	Slight.
CtF	Crouch coarse sandy loam, 30 to 50 percent slopes--------	B	Severe 1-----	Moderate.
CuE	Crouch rocky coarse sandy loam, 5 to 30 percent slopes.	B	Severe 16----	Moderate.
CuG	Crouch rocky coarse sandy loam, 30 to 70 percent slopes.	B	Severe 1-----	Moderate.
CvG	Crouch stony fine sandy loam, 30 to 75 percent slopes.	B	Severe 1-----	Moderate.
DaC	Diablo clay, 2 to 9 percent slopes----------	D	Slight--------	Slight. 1/
DaD	Diablo clay, 9 to 15 percent slopes----------	D	Slight--------	Slight. 1/
DaE	Diablo clay, 15 to 30 percent slopes----------	D	Moderate------	Slight. 1/
DaE2	Diablo clay, 15 to 30 percent slopes, eroded----------	D	Moderate 1---	Slight. 1/
DaF	Diablo clay, 30 to 50 percent slopes----------	D	Severe 1-----	Moderate. 1/

See footnotes at end of table.

TABLE 11.--INTERPRETATIONS FOR LAND MANAGEMENT--Continued

Map symbol	Soil	Hydrologic group	Erodibility	Limitations for conversion from brush to grass
DcD	Diablo-Urban land complex, 5 to 15 percent slopes:			
	Diablo	D		
	Urban land	D		
DcF	Diablo-Urban land complex, 15 to 50 percent slopes:			
	Diablo	D		
	Urban land	D		
DoE	Diablo-Olivenhain complex, 9 to 30 percent slopes:			
	Diablo	D	Moderate 1---	Slight.
	Olivenhain	D	Moderate 1---	Severe.
EdC	Elder shaly fine sandy loam, 2 to 9 percent slopes	B	Moderate 2---	Slight.
EsC	Escondido very fine sandy loam, 5 to 9 percent slopes.	C	Severe 16----	Slight.
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded.	C	Severe 16----	Slight.
EsE2	Escondido very fine sandy loam, 15 to 30 percent slopes, eroded.	C	Severe 16----	Slight.
EvC	Escondido very fine sandy loam, deep, 5 to 9 percent slopes.	C	Severe 16----	Slight.
ExE	Exchequer rocky silt loam, 9 to 30 percent slopes	D	Severe 9-----	Severe.
ExG	Exchequer rocky silt loam, 30 to 70 percent slopes	D	Severe 1-----	Severe.
FaB	Fallbrook sandy loam, 2 to 5 percent slopes	C	Severe 16----	Slight.
FaC	Fallbrook sandy loam, 5 to 9 percent slopes	C	Severe 16----	Slight.
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	Severe 16----	Slight.
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	Severe 16----	Slight.
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	Severe 16----	Slight.
FaE3	Fallbrook sandy loam, 9 to 30 percent slopes, severely eroded.	C	Severe 16----	Severe.
FeC	Fallbrook rocky sandy loam, 5 to 9 percent slopes	C	Severe 16----	Slight.
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes	C	Severe 16----	Moderate.
FeE2	Fallbrook rocky sandy loam, 9 to 30 percent slopes, eroded.	C	Severe 16----	Moderate.
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes:			
	Fallbrook	C	Severe 16----	Slight.
	Vista	B	Severe 16----	Moderate.
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes:			
	Fallbrook	C	Severe 16----	Slight.
	Vista	B	Severe 16----	Moderate.
FwF	Friant fine sandy loam, 30 to 50 percent slopes	D	Severe 9-----	Severe.
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes.	D	Severe 9-----	Severe.
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes.	D	Severe 1-----	Severe.
GaE	Gaviota fine sandy loam, 9 to 30 percent slopes	D	Severe 9-----	Severe.
GaF	Gaviota fine sandy loam, 30 to 50 percent slopes	D	Severe 1-----	Severe.
GoA	Grangeville fine sandy loam, 0 to 2 percent slopes	B	Severe 16----	Slight.
GrA	Greenfield sandy loam, 0 to 2 percent slopes	B	Severe 16----	Slight.
GrB	Greenfield sandy loam, 2 to 5 percent slopes	B	Severe 16----	Slight.
GrC	Greenfield sandy loam, 5 to 9 percent slopes	B	Severe 16----	Slight.
GrD	Greenfield sandy loam, 9 to 15 percent slopes	B	Severe 16----	Slight.
HaG	Hambright gravelly clay loam, 30 to 75 percent slopes.	D	Severe 1-----	Moderate.
HmD	Holland fine sandy loam, 5 to 15 percent slopes	C	Severe 16----	Slight.
HmE	Holland fine sandy loam, 15 to 30 percent slopes	C	Severe 16----	Slight.
HnE	Holland stony fine sandy loam, 5 to 30 percent slopes.	C	Severe 16----	Moderate.

See footnotes at end of table.

TABLE 11.--INTERPRETATIONS FOR LAND MANAGEMENT--Continued

Map symbol	Soil	Hydrologic group	Erodibility	Limitations for conversion from brush to grass
VaB	Visalia sandy loam, 2 to 5 percent slopes	B	Severe 16----	Slight.
VaC	Visalia sandy loam, 5 to 9 percent slopes	B	Severe 16----	Slight.
VaD	Visalia sandy loam, 9 to 15 percent slopes	B	Severe 16----	Slight.
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	B	Severe 16----	Slight.
VbC	Visalia gravelly sandy loam, 5 to 9 percent slopes	B	Severe 16----	Slight.
VsC	Vista coarse sandy loam, 5 to 9 percent slopes	B	Moderate 2---	Slight.
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	Moderate 2---	Slight.
VsD2	Vista coarse sandy loam, 9 to 15 percent slopes, eroded.	B	Moderate 2---	Slight.
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	Moderate 2---	Slight.
VsE2	Vista coarse sandy loam, 15 to 30 percent slopes, eroded.	B	Moderate 2---	Slight.
VsG	Vista coarse sandy loam, 30 to 65 percent slopes	B	Severe 1------	Moderate.
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes.	B	Moderate 2----	Moderate. 3/
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes.	B	Moderate 2----	Moderate. 3/
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes.	B	Severe 1------	Moderate. 3/
WmB	Wyman loam, 2 to 5 percent slopes	C	Moderate 2----	Slight.
WmC	Wyman loam, 5 to 9 percent slopes	C	Moderate 2----	Slight.
WmD	Wyman loam, 9 to 15 percent slopes	C	Moderate 2----	Slight.

1/ Typically a grassland soil; conversion from brush usually not necessary.

2/ Moderate if slope is more than 30 percent, slight if less than 30 percent.

3/ Stoniness or rockiness not a serious impediment to use of grass-planting equipment.

4/ On desert-facing mountain slopes and in valleys, in the eastern part of land resource area 20, the degree of limitation is severe because of climate, regardless of soil properties.

TABLE 16.--ENGINEERING INTERPRETATIONS

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table. Only the most limiting feature or soil horizon is listed for each specific interpretation. No attempt was made to allow for a range in interpretative ratings. No interpretations are given for Urban land and other land types, all of which are highly variable and require onsite investigation]

Soil series and map symbols	Suitability for--		Degree and kind of limitation for--		
	Topsoil	Road fill	Road location	Water retention structures	
				Floor	Embankment
Altamont:					
AtC	Poor: clay---	Poor: A-7----	Severe: CH, A-7.	Moderate: 3 to 5 feet to rock; slope.	Moderate: CH.
AtD, AtD2, AtE, AtE2, AtF	Poor: clay---	Poor: A-7----	Severe: CH, A-7; slope.	Severe: slope-	Moderate: CH.
Anderson:					
AuC	Poor: very gravelly sandy loam.	Good----------	Slight------	Severe: moderately rapid permeability.	Severe: GM.
AuF	Poor: very gravelly sandy loam.	Good----------	Severe: slope.	Severe: moderately rapid permeability; slope.	Severe: GM.
Arlington: AvC	Fair: 2 to 3 1/2 feet to weak hardpan.	Good----------	Slight-------	Moderate: slope.	Severe: SM, less than 35 percent fines.
Auld:					
AwC	Poor: clay---	Poor: A-7----	Severe: CH, A-7.	Moderate: 3 to 5 feet to rock.	Moderate: CH.
AwD	Poor: clay---	Poor: A-7----	Severe: CH, A-7; slope.	Severe: slope-	Moderate: CH.
AyE	Poor: stony clay.	Poor: A-7----	Severe: CH, A-7; slope; 15 to 25 percent stones.	Severe: slope; 15 to 25 percent stones.	Moderate: CH.

TABLE 16.--ENGINEERING INTERPRETATIONS--Continued

Soil series and map symbols	Suitability for--		Degree and kind of limitation for--		
	Topsoil	Road fill	Road location	Water retention structures	
				Floor	Embankment
Carrizo: CeC	Poor: very gravelly sand.	Good	Slight	Severe: very rapid permeability.	Severe: GP or GW.
Chesterton:					
CfB, CfC	Poor: 2 to 3 feet to hardpan.	Fair to poor: A-4 or A-6.	Severe: CL, A-6.	Moderate: slope.	Moderate: SM, more than 35 percent fines.
CfD2	Poor: 2 to 3 feet to hardpan.	Fair to poor: A-4 or A-6.	Severe: CL, A-6.	Severe: slope.	Moderate: SM, more than 35 percent fines.
Chino:					
ChA, ChB	Fair: fine sandy loam over clay loam.	Fair to poor: A-4 or A-6.	Severe: mostly CL, A-6.	Moderate: moderate permeability.	Slight.
CkA	Poor: saline--	Fair to poor: A-4 or A-6.	Severe: CL or ML, A-4 or A-6.	Moderate: moderate permeability.	Moderate: ML or CL.
*Cieneba: ClD2, ClE2, ClG2, CmE2, CmrG, CnE2, CnG2. For Fallbrook part of CnE2 and CnG2, see Fallbrook FeE, FeE2.	Poor: 1/2 to 1 1/2 feet to rock; rocky.	Good	Severe: 1/2 to 1 1/2 feet to rock; rocky.	Severe: rapid permeability.	Severe: SM, less than 35 percent fines.
Corralitos:					
CsB, CsC	Poor: loamy sand over sand.	Good	Slight	Severe: rapid permeability.	Severe: SM, less than 35 percent fines; SP, SW.
CsD	Poor: loamy sand over sand.	Good	Moderate: slope.	Severe: rapid permeability; slope.	Severe: SM, less than 35 percent fines; SP, SW.

TABLE 16.--ENGINEERING INTERPRETATIONS--Continued

Soil series and map symbols	Suitability for--		Degree and kind of limitation for--		
	Topsoil	Road fill	Road location	Water retention structures	
				Floor	Embankment
Exchequer: ExE, ExG----------	Poor: 1/2 to 1 foot to rock; rocky.	Fair to poor: A-4 or A-6.	Severe: 1/2 to 1 foot to rock; slope.	Severe: 1/2 to 1 foot to rock; slope.	Moderate: ML or CL.
* Fallbrook: FaB, FaC, FaC2----------	Fair: sandy loam over sandy clay loam.	Good to poor: A-2, A-4, or A-6.	Severe: CL, A-6.	Moderate: moderate permeability; slope.	Moderate: SM, more than 35 percent fines.
FaD2, FaE2, FaE3----------	Fair: sandy loam over sandy clay loam.	Good to poor: A-2, A-4, or A-6.	Severe: CL, A-6.	Severe: slope.	Moderate: SM, more than 35 percent fines.
FeC----------	Fair: sandy loam over sandy clay loam; rocky.	Good to poor: A-2, A-4, or A-6.	Severe: CL, A-6; slope.	Moderate: moderate permeability; slope.	Moderate: SM, more than 35 percent fines.
FeE, FeE2----------	Fair: sandy loam over sandy clay loam; rocky.	Good to poor: A-2, A-4, or A-6.	Severe: CL, A-6; slope.	Severe: slope.	Moderate: SM, more than 35 percent fines.
FvD, FvE---------- For Vista part of FvD, see Vista VsD2. For Vista part of FvE, see Vista VsE, VsE2, VsG.	Fair: sandy loam over sandy clay loam.	Good to poor: A-2, A-4, or A-6.	Severe: CL, A-6; slope.	Severe: slope.	Moderate: SM, more than 35 percent fines.
Friant: FwF----------	Poor: 1/4 to 1 1/2 feet to rock.	Fair: A-4---	Severe: 1/4 to 1 1/2 feet to rock; slope.	Severe: 1/4 to 1 1/2 feet to rock; slope.	Moderate: SM, more than 35 percent fines.
FxE, FxG----------	Poor: 1/4 to 1 1/2 feet to rock; rocky.	Fair: A-4---	Severe: 1/4 to 1 1/2 feet to rock; slope.	Severe: 1/4 to 1 1/2 feet to rock; slope.	Moderate: SM, more than 35 percent fines.

TABLE 16.--ENGINEERING INTERPRETATIONS--Continued

Soil series and map symbols	Suitability for--		Degree and kind of limitation for--		
			Road location	Water retention structures	
	Topsoil	Road fill		Floor	Embankment
Visalia:					
VaA----------	Good--------	Good to fair: A-2 or A-4.	Moderate: SM or SC, A-2 or A-4.	Moderate: moderate permeability.	Severe: SC or SM 30 to 40 percent fines.
VaB, VaC----------	Good--------	Good to fair: A-2 or A-4.	Moderate: SM or SC, A-2 or A-4.	Moderate: moderate permeability; slope.	Severe: SC or SM 30 to 40 percent fines.
VaD----------	Good--------	Good to fair: A-2 or A-4.	Moderate: SM or SC, A-2 or A-4.	Severe: slope.	Severe: SC or SM 30 to 40 percent fines.
VbB, VbC----------	Fair: gravelly sandy loam over gravelly loam.	Good to fair: A-2 or A-4.	Slight--------	Moderate: moderate permeability; slope.	Severe: SC or SM less than 35 percent fines.
Vista:					
VsC, VsD----------	Fair: 2 to 4 feet to rock.	Good---------	Moderate: 2 to 4 feet to rock.	Severe: moderately rapid permeability.	Severe: SM, less than 35 percent fines.
VsD2----------	Fair: 1 1/2 to 3 1/2 feet to rock.	Good---------	Moderate: 1 1/2 to 3 1/2 feet to rock.	Severe: moderately rapid permeability.	Severe: SM, less than 35 percent fines.
VsE, VsE2, VsG----------	Fair: 1 1/2 to 3 1/2 feet to rock.	Good---------	Severe: slope.	Severe: moderately rapid permeability; slope.	Severe: SM, less than 35 percent fines.
VvD----------	Fair: 1 1/2 to 3 feet to rock; rocky.	Good---------	Moderate: 1 1/2 to 3 feet to rock.	Severe: moderately rapid permeability; slope.	Severe: SM, less than 35 percent fines.
VvE----------	Fair: 1 1/2 to 3 feet to rock.	Good---------	Severe: slope.	Severe: moderately rapid permeability; slope.	Severe: SM, less than 35 percent fines.
VvG----------	Fair: 1 1/2 to 2 1/2 feet to rock.	Good---------	Severe: slope.	Severe: moderately rapid permeability; slope.	Severe: SM, less than 35 percent fines.

Attachment E: Treatment BMP Datasheets

TREATMENT CONTROL BMP DESIGN

Treatment Control BMP 1: Extended Detention Basins

The extended detention basins provided onsite are designed and sized to provide water quality benefits to the project site through means of settling, uptake, and sorption to vegetative material. The detention facilities are located in several drainage areas, and receive flows from the development areas located within the project site.

The water quality volumes for these drainage areas have been calculated using the one of the accepted methods outlined in the San Diego County SUSMP (Urban Runoff Quality Management WEF Manual of Practice No 28).

Extended detention basins are identified based on the area of the project they are located in. Analysis of detention storage routing for peak flow attenuation is treated in the Drainage Study and summarized in Section 3.0 of this report. The following discussion pertains to sizing the basins for water quality treatment purposes per the numeric sizing criteria given by the SUSMP and Municipal Permit.

The extended detention basins are volume-based BMPs. According to the SUSMP, Port of San Diego, and Cities in San Diego County, one option for the sizing of volume-based BMPs is that they shall be designed to mitigate the volume of runoff produced from a 24-hour 85th percentile storm event, determined as the maximized capture urban runoff volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998). It shall be noted that the 85th percentile storm event is different for various parts of the County. According to the San Diego County 85th Percentile Isopluvials map, the 85th percentile storm event for the project site is 0.80 inches.

The referenced formula is as follows:

$Po = (a \times C) \times P24$ (Equation E-1)

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$ (Equation E-2)

Where:
C= Volume Runoff Coefficient
i = Watershed imperviousness ratio (% imperviousness divided by 100)
Po = Maximized detention volume determined using the event capture ratio (recommended for extended detention basins), inches
a = regression constant from least squares analysis
P24 = mean storm precipitation volume, inches (Note: Referenced material calls for a mean storm precipitation for a six hour storm event of 0.57 inches for the San Diego area, the 85th percentile 24-hour event magnitude of 0.80 inches will be used for these calculations as required by County Storm Water Standards Manual and determined from the County Isopluvial Map)

Extended Detention Basins (EDBs) will be provided in Areas 1, 2, 3, 4, and 6, with two basins being proposed for Area 2 and three for Area 6. The EDBs will be used as the primary treatment control BMPs in these areas. These basins will detain low flows and the first flush of storm events, causing sediment and particulate matter to settle out. By removing particulates, the BMP also removes the pollutants attached to the particulates.

Attachment E

Numeric Sizing of Water Quality Control Volume:

For each EDB, the Nasland Hydrology study provides tributary area and proposed additional impervious area. The hydrology study also selects a runoff coefficient for the existing condition hydrology consistent with an existing imperviousness of 10 percent. The total resultant imperviousness for the drainage areas tributary to each proposed EDB is calculated as shown in the table below:

Table E-1: Resultant Percent Imperviousness Determination

Building Area	Tributary Area	Existing Imperviousness	Existing Impervious Area	Additional Impervious Area	Resultant Total Impervious Area	Resultant Total Imperviousness
1	22.70	10.0%	2.70	0.85	3.55	15.6%
2 (North Cluster)	1.94	10.0%	0.19	0.23	0.42	21.9%
2 (South Cluster)	3.45	10.0%	0.35	0.24	0.59	17.0%
3	14.12	10.0%	1.41	2.60	4.01	28.4%
4	5.59	10.0%	0.56	1.91	2.47	44.2%
6	9.28	10.0%	0.93	2.40	3.33	35.9%

Based on the resultant imperviousness percentages determined above, Equations E-1 and E-2 are used to determined the required Water Quality Control Volume (WQCV) for each EDB as shown below.

Table E-2: Required Water Quality Control Volumes

Building Area	Resultant Total Imperviousness	C Factor for WQCV	Regression Constant	85th Percentile 24-hour Rainfall	Tributary Area	Water Quality Control Volume
				(inches)	(acres)	(cubic-feet)
1	15.6%	0.14	1.545	0.80	22.70	14,258
2 (North Cluster)	21.9%	0.18	1.545	0.80	1.94	1,574
2 (South Cluster)	17.0%	0.15	1.545	0.80	3.45	2,368
3	28.4%	0.22	1.545	0.80	14.12	13,724
4	44.2%	0.30	1.545	0.80	5.59	7,615
6	35.9%	0.26	1.545	0.80	9.28	10,693

Runoff from Area 6 will be treated in three separate EDBs, described on the treatment control maps at EDB 6A, EDB 6B, and EDB 6C. The 10,693 cubic feet of treatment storage will be allocated between the three EDBs based on the size of their tributary drainage areas. Approximately, 15% of Area 6 is tributary to EDB 6A, 45% is tributary to EDB 6B, and 40% is tributary to EDB 6C. The volume breakdown for the three basins is therefore divided as shown below.

Table E-3: Area 6 Detention Volumes

EDB Description	% of Area 6	Water Quality Control Volume
		(cubic-feet)
EDB 6A	15%	1,604
EDB 6B	45%	4,812
EDB 6C	40%	4,277

Locations of the EDBs are provided on the site grading plans, hydrology study exhibits, and Treatment Control Maps. Final outlet structure design will be provided at the time of final engineering and will consider both treatment volume drawdown (with a targeted drain time of approximately 48 hours) and attenuation of peak flows from higher magnitude storm events as discussed in the project hydrology study.

Treatment Control BMP 2: Vegetated Swale

Vegetated swales are located within every developed area on site. As the runoff flows through the swale, the vegetation will provide some removal of pollutants. Vegetated swales will be planted with native plants to minimize maintenance and irrigation needs. The main function of the swales is to act as a conveyance for storm water. In most areas, detention basins will be provided in the development area downstream of the swales. Therefore, the swales will provide enhanced water quality treatment, but will not be the main treatment control BMP. In many areas, the swales may be steep due to topography constraints. These swales will need to be heavily planted to protect against erosion. As a result of the steeper slopes, however, the water quality treatment will be decreased.

The swales will be designed to convey 2 year storms without erosive velocities, and will also have adequate capacity to convey the 100 year storm. The swales will be trapezoidal in shape with a 3:1 side slope or flatter. The bottom of the swales will be 2 to 8 feet wide. The swales will be planted with County approved native vegetation. There will be minimal irrigation and maintenance required for native vegetation. Final design of the swales will be completed at the time of final engineering.

Where detention basins are infeasible, the swales will serve as the primary treatment control for runoff. This occurs in Area 5 as described below.

In Area 5, the vegetated swales will be designed with a maximum 4% slope. Ideally, the swale will have a 1-2% slope. Per SUSMP Appendix F Section F.1 `Biofilters", no minimum or maximum slopes are required for treatment purposes. Table F.1 of the SUSMP states under design factors that there are no minimum dimensions or slope restrictions for treatment purposes. Therefore use of vegetative swales as a primary treatment control BMP for Area 5 is adequate.

Extended detention basins are not feasible for Area 5 due to the location of existing houses, gravel roads, garages, and leach fields. The majority of Area 5 surrounding the maintenance area consists of existing developed areas.

Treatment Control BMP 3: Rain Garden

A Rain Garden is proposed to be located in the parking lot median in the easterly portion of Area 2. Soils in this area are CID2 and are Type B soils with "rapid" permeability. The final project soils report will determine the infiltrate rate for the Rain Garden and will also determine the depth to groundwater in this area. The County of San Diego provides seven requirements that must be met for infiltration BMPs to be considered feasible for a project site. They are as follows:

1. Urban runoff from commercial developments shall undergo pretreatment to remove both physical and chemical contaminants, such as sedimentation or filtration, prior to infiltration.

Parking spaces within the lot with the proposed Rain Garden will be constructed with native granular material, in addition flow from the parking lot will enter a bioswale for pretreatment prior to entering the Rain Garden.

2. All dry weather flows shall be diverted from infiltration devices except for those non-stormwater discharges authorized pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1): diverted stream flows, rising ground waters, uncontaminated groundwater infiltration [as defined at 40 CFR 35.2005(20)] to stormwater conveyance systems, uncontaminated pumped ground water, foundation drains, springs, water from crawl space pumps, footing drains, air conditioning condensation, flow from riparian habitats and wetlands, water line flushing, landscape irrigation, discharges from potable water sources other than water main breaks, irrigation water, individual residential car washing, and dechlorinated swimming pool discharges.

An earthen drainage swale is proposed south of the parking lot to preclude dry weather run-on from entering the Rain Garden. Additional classes of non-stormwater flow described above are not anticipated to occur in the parking lot area.

3. Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment BMPs are to be used.

Site Design, Source Control, and LID BMPs will be employed in the parking lot area to protect groundwater quality near the Rain Garden.

4. The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater does not support beneficial uses, this vertical distance criterion may be reduced, but cannot be less than 4 feet, provided groundwater quality is maintained.

The Rain Garden will be designed such that the distance from the invert of the Rain Garden to the seasonal high water level in the groundwater is greater than 10 feet.

5. The soil through which infiltration is to occur shall have physical and chemical characteristics (such as appropriate cation exchange capacity, organic content, clay content, and infiltration rate) that are adequate for proper infiltration durations and treatment of urban runoff for the protection of groundwater beneficial uses.

The soils in the area of the Rain Garden are classified as Type B soils with low clay content and rapid permeability characteristics.

6. Infiltration structural treatment BMPs shall not be used for areas of industrial or light industrial activity; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (bus, truck, etc.); nurseries; and other high threat to water quality land uses and activities as determined by the County.

The infiltration BMP is not proposed to treat runoff from any of the above listed land uses. The BMP will treat runoff from a parking lot within a campground that will receive a light amount of daily traffic.

7. The horizontal distance between the base of any infiltration structural BMP and any water supply wells shall be 100 feet or as determined on an individual, site-specific basis by the County.

There are no water supply wells located within 100 feet of the proposed Rain Garden.

Given that the Rain Garden will meet the seven County criteria given in the SUSMP, it is determined that the Rain Garden will function as an effective infiltration BMP and provide the necessary treatment of the parking area.

COUNTY OF SAN DIEGO SUSMP

APPENDIX F

TREATMENT BMP DESIGN GUIDELINES

APPENDIX F TREATMENT BMP DESIGN GUIDELINES

Treatment BMP Design Guidelines

There are currently seven categories for treatment BMPs. These include biofilters, detention basins, infiltration basins, wet ponds and wetlands, drainage inserts, filtration systems, and hydrodynamic separators. Design guidelines for these categories are described below. The County may update these BMPs as needed.

F.1 Biofilters

Biofiltration swales are vegetated channels that receive directed flow and convey storm water. Biofiltration strips, also known as vegetated buffer strips, are vegetated sections of land over which storm water flows as overland sheet flow. Pollutants are removed by filtration through the grass, sedimentation, adsorption to soil particles, and infiltration through the soil. Swales and strips are mainly effective at removing debris and solid particles, although some dissolved constituents are removed by adsorption onto the soil.

Appropriate Applications and Siting Constraints:

Swales and strips should be considered wherever site conditions and climate allow vegetation to be established and where flow velocities are not high enough to cause scour. Even where strips cannot be sited to accept directed sheet flow, vegetated areas provide treatment of rainfall and reduce the overall impervious surface.

Factors Affecting Preliminary Design:

Interim criteria for the design of swales and strips include the requirements in Sections 3.1, 3.2, and 3.3 of the Guidelines. These sections direct engineers to "maximize vegetation-covered soil areas of a project," "minimize impervious surfaces" and "minimize overland and concentrated flow depths and velocities." Designers should also consider the following factors:
Swales have two design goals: 1) maximize treatment, 2) provide adequate hydraulic function for flood routing, adequate drainage and scour prevention. Treatment is maximized by designing the flow of water through the swale to be as shallow and long as site constraints allow. No minimum dimensions are required for treatment purposes, as this could exclude swales from consideration at some sites. Swales should also be sized as a conveyance system calculated according to County procedures for flood routing and scour.
To maximize treatment efficiency, strips should be designed to be as long (in the direction of flow) and as flat as the site will allow. No minimum lengths or maximum slopes are required for treatment purposes. The area to be used for the strip should be free of gullies or rills that can concentrate overland flow and cause erosion.
Table 5-4 summarizes preliminary design factors for biofiltration.

Table F.1: Summary Of Bio-filtration Design Factors (Strips And Swales)

Description	Applications/Siting	Preliminary Design Factors
Swales are vegetated channels that receive and convey storm water. Strips are vegetated buffer strips over which storm water flows as sheet flow. Treatment Mechanisms: • Filtration through the grass • Sedimentation • Adsorption to soil particles • Infiltration Pollutants removed: • Debris and solid particles • Some dissolved constituents	• Site conditions and climate allow vegetation to be established • Flow velocities not high enough to cause scour	• Swales sized as a conveyance system (per County flood routing and scour procedures) • Swale water depth as shallow as the site will permit • Strips sized as long (in direction of flow) and flat as the site allows • Strips should be free of gullies or rills • No minimum dimensions or slope restrictions for treatment purposes • Vegetation mix appropriate for climates and location

F.2 Detention Basins

Detention devices are impoundments where the water quality volume is temporarily detained under quiescent conditions, allowing sediment and particulates to settle out. A conceptual schematic of a detention basin is shown in Figure 5.3.1.

Detention devices remove litter, settleable solids (debris), and total suspended solids (TSS). Pollutants, such as heavy metals, that are attached (adsorbed) to the settled particulate matter will also be removed.

Appropriate Applications and Siting Constraints

Detention devices should be considered for implementation wherever site conditions allow.

One important siting requirement is that sufficient head is available so that water stored in the device does not cause a backwater condition in the storm drain system, which would limit its capacity. A second siting requirement is that seasonally high groundwater is no higher than the bottom elevation of the device for reasons described below.

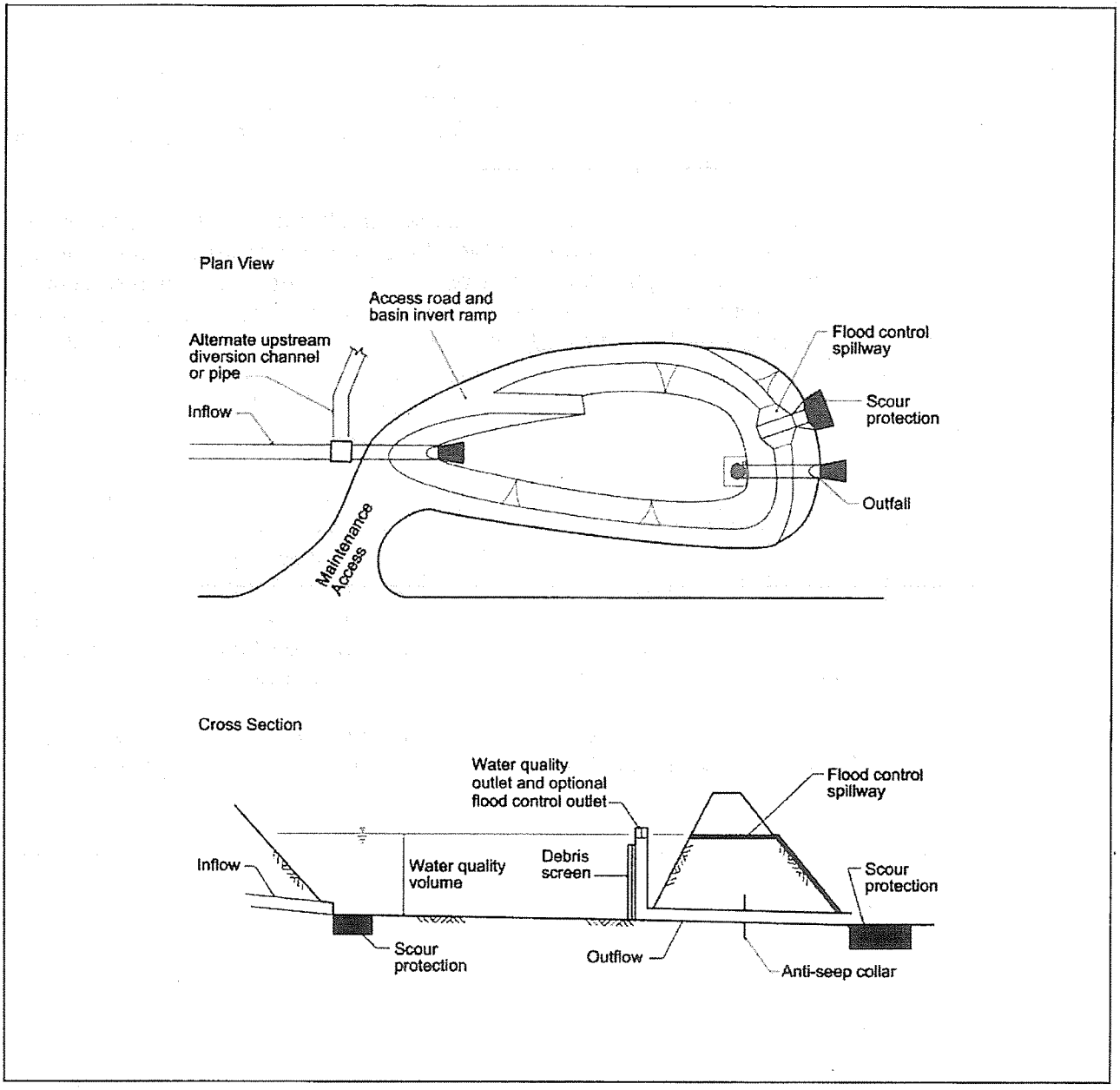

Figure F.2.1
Example of Extended Detention Basin Schematic
(Not a Standard Plan)

FACTORS AFFECTING PRELIMINARY DESIGN:

Detention devices should be designed to hold at least the 24-hour water quality volume. The maximum water level in the detention device should not cause groundwater to occur under the roadway within 0.2 m (8 inches) of the roadway subgrade. A flow-path-to-width ratio of at least 2:1 is recommended. Baffles or interior berms to accommodate the geometry of the site can accomplish this ratio.

Liners are not generally required for detention basins. Infiltration is permissible if the infiltrated water does not surface in an undesirable place off-site or threaten the stability of a slope or embankment down gradient of the basin. To protect groundwater quality and to ensure dry conditions for maintenance of unlined basins, the distance between the basin invert and seasonally high groundwater should be at least 2 m (6 ft). Where the groundwater is higher than this, the basin should be provided with an impermeable liner. In no case should the seasonally high groundwater be higher than the bottom elevation of the detention device to prevent uplift of tanks or liners.

Discharge should be accomplished through a water quality outlet. An example is shown in Figure 3.2.2. A rock pile or rock-filled gabions can serve as alternatives to the debris screen. The water quality outlet should be designed to empty the device within 24 to 72 hours. (The 24-hour limit is chosen to provide adequate settling time; the 72-hour limit is chosen to minimize the potential for mosquito breeding.) Because detention basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

Public health and vector control authorities should be consulted to verify the acceptability of detention basins and the maximum drawdown time allowed to avoid mosquito problems.

The inlet structure of the basin should be designed to divert the peak hydraulic flow (calculated according to County procedures for flood routing and scour) when the basin is full. Alternatively, an overflow structure sized according to these criteria can be provided in one of the downstream walls or berms. A third alternative is to include a flood control outlet in the top of the water quality outlet. In this case, an additional outlet (riser or spillway) should be supplied to prevent overtopping of the walls or berms. Entering flows should be distributed uniformly at low velocity to prevent re-suspension of settled materials and to encourage quiescent conditions.

The site must have sufficient area for a perimeter maintenance road and safe access to and from the site from local roads. Basin side slopes must be shallow enough to permit tracked vehicles to access the basin bottom for maintenance. Alternatively, an access ramp should be provided. Preliminary design factors for detention basins are summarized in Table 3.2.1.

Table F.2 Summary Of Extended Detention Basin Design Factors

Description	Applications/Siting	Preliminary Design Factors
Impoundments where the water quality volume is temporarily detained Treatment Mechanisms: • Sedimentation • Infiltration (if basin unlined) Pollutants removed: • Sediment and particulates • Litter • Sorbed pollutants (heavy metals, O&G)	• Sufficient head to prevent backwater condition in the storm drain system • Seasonally high groundwater below basin invert • Consult public health and vector control authorities	• Size to capture the 24-hr water quality volume • Flow-path-to-width ratio of at least 2:1 recommended • Maximum water level should not cause groundwater to occur under the roadway within 0.2 m of the roadway subgrade • Basin invert ≥ 2 m above seasonally high groundwater or else a impermeable liner is required • Scour protection on inflow, outfall and spillway • Maintenance access (road around basin and ramp to basin invert) • Upstream diversion channel or pipe, downstream overflow structure or flood control outlet • Discharge through a water quality outlet with debris screen (or equivalent) • Outlet design to empty basin within 24 to 72 hrs • Flows should enter at low velocity

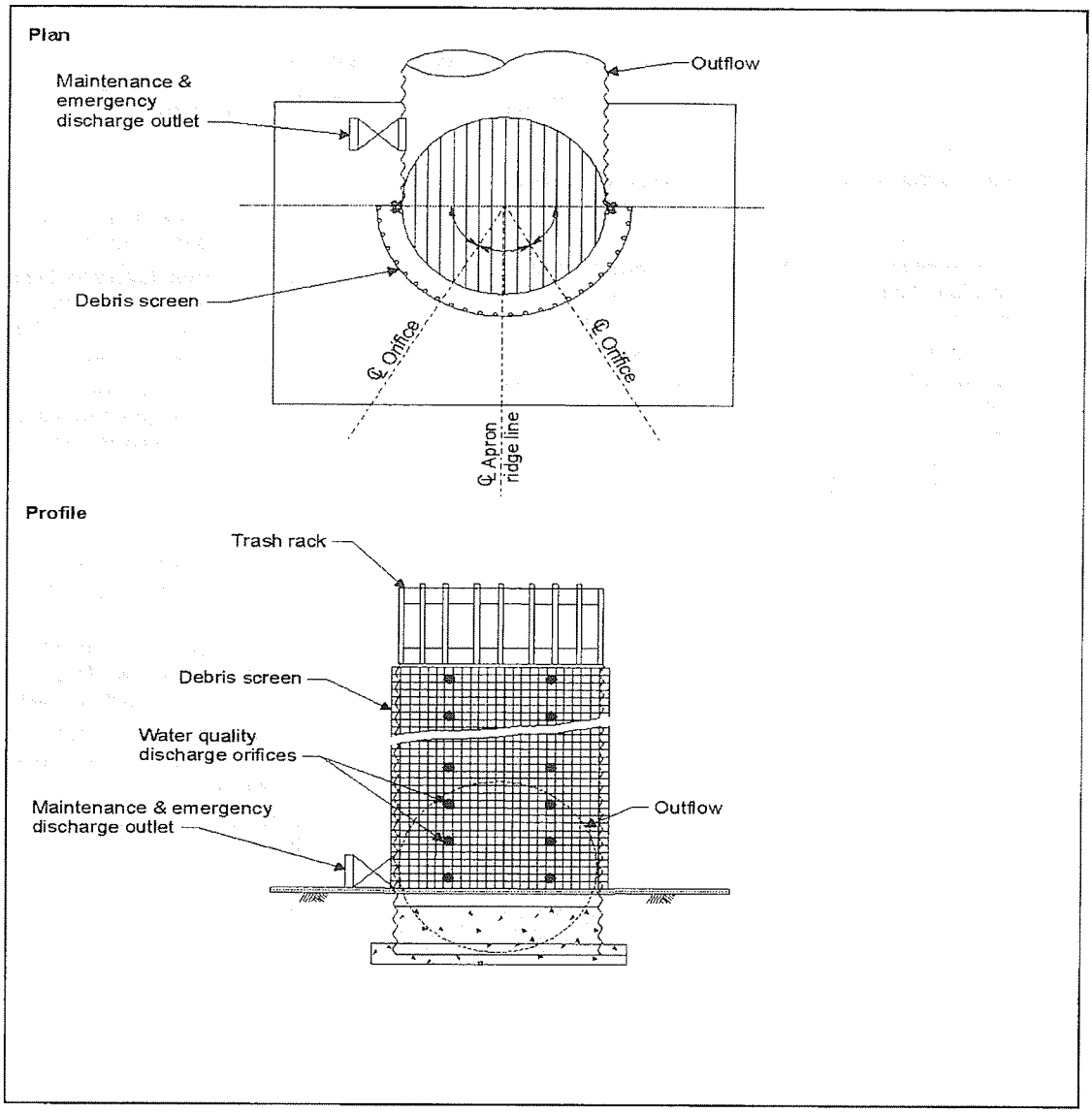

Figure F.2.2
Detention Basin Outlet Structure Schematic
(Not a Standard Plan)

E.3 Infiltration Basins

Infiltration basins are depressions designed to hold runoff and infiltrate it directly to the soil rather than discharging it to receiving waters. A conceptual schematic illustration of an infiltration basin is shown in Figure F.3.

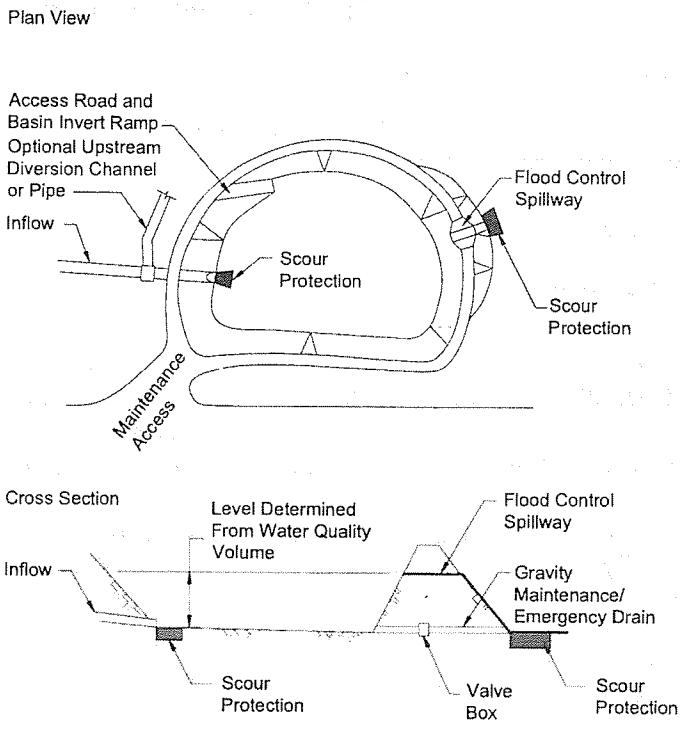

Figure F.3
Example Conceptual Schematic of Infiltration Basin Design (Not a Standard Plan)

Appropriate Applications and Siting Constraints:

Infiltration basins should be considered wherever site conditions allow and the design water quality volume exceeds 0.1 acre-feet. Appropriate sites for infiltration basins have sufficient soil permeability (both vertical and horizontal), have a sufficiently low water table, do not present a threat to local groundwater quality and are at a sufficient elevation to allow gravity drainage (of the basin) for maintenance purposes.

The following steps are recommended for determining the feasibility of infiltration BMPs. The major components are Pre-screening, Site Screening, Site Investigation and Preliminary Design.

1. Pre-Screening for the Infiltration BMP

Pre-screening for the infiltration BMP involves collecting site-specific information necessary to determine, in consultation with the RWQCB, whether infiltration is an appropriate storm water treatment for the site. No field-testing is anticipated during this phase. The steps involved in pre-screening include:

1. Information collection; and
2. Preliminary determination of infiltration appropriateness through consultation with RWQCB on the results.

The following sections describe the steps involved.

Information Collection

Some of the basic site-specific data required for the determination of the appropriateness of the infiltration BMP are found in the sources listed below. Additional data may be required for local conditions. Data collected by the project engineer or proponent include, but may not be limited to:

- Outfall inventory data (if available), project alignment, right-of-way, annual average daily traffic (ADT), outfall locations, and other basic project maps and data;
- Tributary drainage areas and surrounding land uses (from outfall inventory, as-builts, aerial photographs, GIS data from the County and local planning agencies);
- Site surface hydrology data: tributary drainage area, runoff coefficients, drainage network, travel times, etc., needed to design facilities to the County's hydrologic/hydraulic criteria;
- Basin Plan groundwater beneficial uses and known impairments (RWQCB);
- If available, runoff quality data for appropriate land use in catchment area;
- Water quality treatment volume per County SUSMP;
- Site soil characteristics:
  - Indigenous soil types: NRCS soil maps and corresponding hydrologic soil classes;
  - Soil infiltration rates (estimated and from any existing on-site testing in the vicinity by others); and

  - Project grading plans or as-built plans (if retrofit), if available.
- Existing groundwater and hydrogeology information:
  - Maps of local aquifers underlying the alignment or location of the proposed project;
  - Aquifer groundwater quality and seasonal groundwater levels: monitoring well data, U.S. Geological Survey (USGS), Department of Water Resources (DWR), and local public agency maps and databases;
  - Local groundwater quality concerns: Consult RWQCB, California Department of Health Services (DHS), local environmental/health department (city/county);
  - Site hydrogeology (from any existing boring logs: lenses, hardpan, etc.);
  - Known contaminated groundwater plumes (RWQCB); and
  - Groundwater rights data: adjudicated basins, other rights (RWQCB, DHS); and
- State Water Information Management System data for project area (SWRCB).

During the data collection process, the proponent should brief the RWQCB regarding the project for which the BMP is being considered, and request assistance in the data collection process as needed.

Preliminary Determination for Appropriateness of Infiltration

Once the data above have been collected and placed in the context of the alignment and/or location of the facility being considered for infiltration BMPs, the project engineer will use the data collected and follow the procedure outlined in below.

Salient steps include:

1. Determine if the San Diego Basin Plan or other local ordinances provide influent limits on quality of water that can be infiltrated. Compare with runoff quality, and determine if infiltration is permissible. If not, consider detention basins.
2. Determine if local agencies, public health authorities, legal restrictions, or other concerns preclude consideration of infiltration of storm water runoff. Consult with RWQCB and representatives of appropriate authorities as needed. If infiltration into the aquifer is not acceptable to local authorities, consider detention basins.
3. Estimate the quality of runoff from the facility draining into the proposed infiltration basin using data from a storm water database and/or annual

research summaries.

Compare the estimated runoff water quality with available groundwater quality data, using receiving water objectives from the RWQCB Basin Plan for each groundwater beneficial use. Determine if the separation between the maximum anticipated seasonal high groundwater and the proposed basin invert is at least 3 m (10 ft). Tabulate the results and make a preliminary determination of the appropriateness of the infiltration BMP.

4. Contact the RWQCB to review procedures followed, what information is available and what information is not available. Present the compiled data and the results of the preliminary determination to the RWQCB.
5. The County will jointly review the data, and, if necessary, gather additional existing information if available data are deemed insufficient for a preliminary determination. The County will then re-convene to make the determination on whether to proceed with infiltration.

If the determination is negative (infiltration *not* appropriate), consider detention basins. If determination is positive (infiltration potentially appropriate), proceed to infiltration site screening.

2. Site Screening

Using data gathered in the pre-screening process, perform an initial desktop screening of sites to narrow the number of potential sites to those that can be considered for field investigations. As needed, collect additional information, and follow the procedures below:

- Estimate soil type (consider NRCS Hydrologic Soil Groups (HSG) A, B, or C only, as shown in Table 5-4) from soil maps and/or USDA soil survey tables and/or background information; in areas where septic systems are in widespread use, the County Environmental Health Department should have information on appropriate soil types for infiltration of onsite wastewaters.

TABLE F-4: TYPICAL INFILTRATION RATES FOR NRCS TYPE AND HSG CLASSIFICATIONS

NRCS Soil Type	HSG Classification	Infiltration Rate	
		cm/hr	(in/hr)
Sand	A	2.0	(8.0)
Loamy sand	A	5.1	(2.0)
Sandy loam	B	2.5	(1.0)
Loam	B	1.3*	(0.5)*
Silt loam	C	0.6	(0.25)
Sandy clay loam	C	0.4	(0.15)
Clay loam & silty clay loam	D	<0.2	(<0.09)
Clays	D	<0.1	(<0.05)

* Minimum rate for infiltration basins. Silt loams may also be acceptable (HSG C) if geotechnical investigations demonstrate adequate infiltration rates.

- Also review other key available data: percent silt and clay, presence of a restrictive layer, permeable layers interbedded with impermeable layers, and seasonal high water table. Other geotechnical considerations include location in seismic impact zones, unstable areas, such as landslides and Karst terrains, and those with soil liquefaction and differential settlement potential. Generally, sites should not be constructed in fill, or on any slope greater than 15 percent.
- The minimum acceptable spacing between the proposed infiltration basin invert and the seasonal high water table is 3 m (10 feet). If a separation of less than 3 m (10 feet) is proposed, the approval of the local RWQCB is required.
- Infiltration basins should not be sited in locations over previously identified contaminated groundwater plumes. Setback distance should be determined in coordination with the RWQCB.
- Estimate infiltration rate for maximum infiltration for soil type using Table F-4.
- Estimate the area required for infiltration as follows:

$$A_{est} = 12 \cdot SF \cdot WQV / k_{est} \cdot t \qquad \text{(Eq. 1)}$$

Where:

A_{est}	=	estimated area of invert of basin, ft^2
12	=	conversion factor from inch to feet
SF	=	safety factor of 2.0
WQV	=	water quality volume calculated from the design storm, ft^3
k_{est}	=	estimated infiltration rate from Table 5-4, in/hr
t	=	draw-down time, 48 hours

- The infiltration basin should be located outside the 9 m (30 ft) clear recovery zone, 300 m (1,000 ft) from any municipal water supply well,

30 m (100 ft) from any private well, septic tank or drain field, and 60 m (200 ft) from a Holocene fault zone.

3. Site Investigation

1. Obtain list of candidate sites (within project limits) that pass the screening process, if available).
2. Perform site investigation to identify any: (a) Regulatory permit required, (b) major underground utility interference, (c) Transportation improvement plan conflicts, or (d) General plan land use data for tributary area.
3. If the parcel is outside of R/W, for planning to proceed, it must generate greater than 50% of the total tributary runoff. Otherwise discontinue investigation of parcel.
4. Assess the feasibility (degree of plumbing and available area) of directing runoff from additional tributary area to the site (other off-site areas are secondary). Consider potential downstream impacts from diversions and cost of diverting additional flow. Diversions of tributary area to unimproved conveyances (creeks/streams) is prohibited. Diversions to improved conveyances may be permitted if it can be demonstrated that the conveyance has sufficient capacity to accommodate the additional flow.
5. Investigate feasibility of infiltration using criteria above and procedure in Section 4: Procedure for preliminary infiltration basin site investigation. Recalculate and verify area requirements using the collected field data. Use Equation 1 above and the lowest measured infiltration rate to calculate area of basin.
6. If an infiltration basin is feasible, proceed to Section 5 Preliminary Design.

4. Procedure for Preliminary Infiltration Basin Site Investigation

The following scope of work defines the steps for infiltration basin feasibility studies. This scope of work provides for a level of investigation necessary to determine if an infiltration basin may be feasible on the subject site. The screening procedure is terminated if the site does not meet the criteria for any step, and assessment of the site continues for a detention basin.

The depth to groundwater must be known as the first step in feasibility because a high groundwater table can lead to infiltration failure and potential contamination of the groundwater table. The *in situ* infiltration rate at the basin invert must also be known to ensure that infiltration of the calculated water quality volume is possible within 48 hours. Due to the extreme variability of site conditions, field investigation is required to determine the depth to groundwater and *in situ* infiltration rate.

The scope of work comprises two phases:

- Initial Investigation; and
- Detailed Investigation as described below.

Initial Investigation

The initial investigation comprises two parts: A) Initial technical field screening and determination of groundwater elevations, and B) Geotechnical investigation for soil lithology and select chemical testing. To streamline the initial investigation phase, Part A will be performed first, followed by Part B if the Part A criterion of at least 3 m (10 ft) clearance for the groundwater elevation below the basin invert is satisfied and the engineer approves the site for further consideration. Consult the local RWQCB for approval of proposed groundwater separation less than 3 m (10 ft).

Part A Initial Technical Field Screening and Determination of Groundwater Elevation

An initial indication of the seasonal high groundwater water table elevation will be determined by using a piezometer, previous studies, or other accepted geotechnical means. The piezometer will be installed to a depth of at least 6 m (20 ft) below the proposed basin invert using the direct push or other suitable method. Groundwater levels will be observed for at least 24 hours after installation. As part of this task, an engineer will conduct a site reconnaissance to evaluate the site conditions. Site screening criteria in Section 2 should be considered.

A regional groundwater review will be performed based on the available data, including, but not necessarily limited to:

- Previously compiled databases on potential BMP sites (such as outfall inventory databases);
- Data and maps available from regional government databases, DWR, and the County sources;
- Local soil survey data from the NRCS and other sources;
- Soil lithology, infiltration rate and groundwater depth data from the County or other specialists that approve septic system installations in the local area;
- Information on local groundwater beneficial uses and groundwater quality issues from the RWQCBs and other water agencies; and
- Information on local groundwater-related drinking water issues from DEH.

The geotechnical professional will make a determination on a site-by-site basis, whether the groundwater elevation determined after 24 hours can be considered

to be a reasonable indication of the seasonal high water table for the purposes of the evaluation of the groundwater depth criteria, described below. If such determination cannot be made reasonably based on the available data, the site will be recommended for a longer period of water table elevation monitoring, as necessary.

If the initial seasonal high groundwater elevation indication is within 3 m (10 ft) of the invert of the proposed infiltration basin, the site will be eliminated from further consideration unless the local RWQCB requires installation of an infiltration basin with less than 3m separations to groundwater, and that provides adequate groundwater protection. If there is not a reliable indication that the seasonal high water table is at least 3 m (10 ft) below the invert of the proposed infiltration basin (i.e., if there is reason to believe the water table may rise to within 3 m (10 ft) of the proposed invert), a more extensive groundwater table elevation investigation will be performed as outlined below in Part 2.C of the Detailed Investigation procedure described below. If the groundwater elevation at the site clearly exceeds 3 m (10 ft) from the proposed basin invert and all other criteria in the initial investigation are satisfied, a detailed groundwater elevation determination will not be required.

Part B Geotechnical Investigation for Soil Lithology and Select Chemical Testing

An initial soil investigation will be performed to adequately understand soil lithology and determine:

- If there are potential problems in the soil structure that would inhibit the rate or quantity of infiltration desired; or
- If there are potential adverse impacts that could result from locating the infiltration basin at the site to either structures, slopes or groundwater.

Geotechnical trenches (or at the option of the engineer, a boring may be used) will be dug using a backhoe at one or two locations within each site, depending on the site conditions. Clearance of the site for hazardous contaminants through the appropriate District should be done prior to drilling by the geotechnical professional conducting the work. Underground Service Alert (USA) clearance will also be obtained. The trenches will be at least 2 m (6 ft) long and 2 m (6 ft) deep below the proposed basin invert. The soil profiles will be carefully logged to determine variations in the subsurface profile. Of greatest importance is the presence of fine-grained materials such as silts and clays, which should be determined by direct measurement of particle size distribution. It is anticipated that two to four soil samples will be collected for determination of the soil particle size distribution at each site. Samples will be collected from the soil profiles at different horizons and transported to a laboratory for soil texture and chemical testing as described below:

- Soil textures that tend to promote infiltration include sands, loamy sands, sandy loams, and loams (and possibly some of the coarser silt loams) in the NRCS classification system, or GW, GM, SP, SW and GC, SC, SM, ML (unified soil classification), subject to clay and clay/silt percentages shown below and the judgment of the field engineer or soil scientist.
- The soil in the first 300 mm (12 inches) below the basin invert will be tested for organic content (OC), pH, and cation exchange capacity (CEC). Values that promote pollutant capture in the soil are: OC > 5 percent, pH in the range of 6-8, and CEC > 5 meq/100 g of soil. In general, the soil should not have more than 30 percent clay or more than 40 percent of clay and silt combined.

In addition, the trenches should be examined for other characteristics that may adversely affect infiltration. These include evidence of significant mottling (indicative of high groundwater), restrictive layer(s), and significant variation in soil types horizontally and vertically. A summary report will be prepared addressing the issues noted above, with recommendations on the suitability of the site for infiltration and the necessity of carrying out the next phase of the investigation. (All the site reports will ultimately be combined in a single report.) Caltrans will give the 'go/no go' instructions for the detailed investigation phase for the sites deemed acceptable from the initial investigation.

Detailed Investigation

If the site conditions still appear favorable to infiltration after the geotechnical review and soil investigations, a detailed field investigation will be undertaken, which includes Part A, Detailed Subsurface Soil Investigation, Part B, In-Hole Conductivity Testing, and Part C, Detailed Groundwater Elevation Determination.

Part A Detailed Subsurface Soil Investigation

Borings will be drilled to a maximum depth of 15 m (50 ft) (or refusal) for each detailed investigation location at the discretion of the geotechnical professional. Samples will be obtained at 1.5 m (5-ft) intervals for soil characterization and laboratory testing. Bulk samples will also be collected at shallow depths to verify information collected in Parts A and B of the Initial Investigation.

Part B In-hole Conductivity Testing

Infiltration rate tests or another method approved by the geotechnical engineer will be performed at the proposed basin invert. The tests will be located to measure infiltration rates in the bed of the proposed basin.

The minimum acceptable infiltration rate as measured in any of the test holes is 1.3 cm/hr (0.5 in/hr). If any test hole shows less than the minimum value, the site will be disqualified from further consideration. If the infiltration rate at the site is significantly greater than 6.4 cm/hr (2.5 in/hr), the RWQCB must be consulted,

and the RWQCB must conclude that the groundwater quality will not be compromised, before approving the site for infiltration.

If the site is constructed in fill or partially in fill, it will be excluded from consideration unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed, rather than flocculated state, greatly impacting permeability.

The geotechnical investigation will be sufficient to develop a good understanding of how the storm water runoff will move in the soil (horizontally or vertically), and if there are any geological conditions that could inhibit the movement of water.

Part C Detailed Groundwater Elevation Determination

If a detailed investigation to determine the groundwater elevation is required per the guidance above and, in the opinion of the engineer, the seasonal high groundwater elevation may come within 3 m (10 ft) of proposed basin invert) at least one and possibly two (per the recommendation of the geotechnical engineer) groundwater monitoring wells will be installed. One well will be installed within the proposed basin footprint and the other, if needed, will be installed near the basin but downgradient by about 10 m (30 feet). The wells will be observed over a wet and dry season. This observation period will be extended to a second wet season (at the direction of the County) if the first wet season produces rainfall less than 80% of the historical average. The minimum acceptable spacing between the proposed infiltration basin invert and the seasonal high water table, as measured at either of the two established monitoring wells, is 3 m (10 ft), unless, in coordination with the RWQCB, it can be demonstrated that the groundwater will not be adversely impacted. A geotechnical professional will oversee the detailed investigation and must also consider other potential factors that may influence the groundwater elevation, such as local or regional groundwater recharge projects, future urbanization or agriculture. The geotechnical professional shall also examine the soil borings for indications of previous high water.

A final geotechnical report, overseen by a geotechnical professional, summarizing the findings of the investigation will be prepared. The report will include all results from the initial as well as detailed investigation phases of the feasibility study.

5. Preliminary Design

Table F-5 summarizes preliminary design factors for infiltration basins.

1. Obtain site topography (one-half meter contours, 1:500 scale). Extend topography 25 m beyond the site perimeter in all directions and along the drain line to the location of the outfall to the local receiving water.

2. Develop a conceptual grading plan for improvements showing basin, maintenance access, basin outlet and extent of R/W requirements to accommodate the improvements. The basin invert must not have a slope of greater than 3%.
3. Develop unit cost-based cost estimate to construct the infiltration basin. Include allowances for hazardous/unsuitable materials, traffic management, storm drain system improvements (as needed and determined by engineer).
4. Develop single paragraph assessments of: nonstandard design features, impact on utilities, hydrology (WQV, peak flow, land use), R/W total area needed, current ownership), planting and lighting, permits, hazardous materials, environmental clearance and traffic management.

TABLE F.5: SUMMARY OF INFILTRATION BASIN SITING AND DESIGN CRITERIA

Description	Applications/Siting	Preliminary Design Factors
Depressions designed to hold runoff and infiltrate into the soil without discharge Treatment Mechanism: • Infiltration Pollutants removed: • All constituents	• > 3 m (w ft) to seasonally high water table (≥ 1.2 m [4 ft] if justified by adequate groundwater observations for a minimum of 1 year) • Soil infiltration rate ≥ 1.3 cm/hr (0.5 in/hr) • Clay content < 30%, and < 40% clay and silt combined • Sufficient horizontal hydraulic capacity • Infiltrated water is unlikely to affect the stability of downgradient structures, slopes, or embankments • Runoff quality is ≥ standards for infiltration to local groundwater • If pretreatment is required, only approved BMPs should be considered • Consult with RWQCB, water agencies, vector control authorities, and local utilities	• Maintenance access (road around basin and ramp to basin invert) • Optional upstream diversion channel or pipe, or downstream overflow structure • Flood control spillway • Scour protection on inflow and spillway • Size to capture the 24-hr water quality volume • Infiltrate water quality volume within 48 hours • Use ½ the measured infiltration rate to size the basin • > 3 m downgradient and 30 m (100 ft) upgradient from structural foundations • ≥ 30 m (100 ft) from drinking water wells • Emergency/maintenance gravity drain

Attachment F: Operations and Maintenance Program

Maintenance agreement to be completed at the time of final engineering. See Section 6.0 of the SWMP for discussion regarding BMP maintenance.

Attachment G: Fiscal Resources

Fiscal Resources are discussed in Section 6.2 of the SWMP document.

ATTACHMENT H

CERTIFICATION SHEET

This Storm Water Management Plan has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

11/11/09

Paul D. Haaland
Registered Civil Engineer
RCE No. 63656, Exp. 9/30/10

Date

Attachment I: Addendum

Information added to this SWMP after approval shall be entered in this attachment.